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Volume 10, Number 1 Spring, 1990

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Front Cover: *Bulbophyllum longiflorum* from FitzGerald "Australian Orchids" 2, Pt. 5 (1893)

Rear Cover: *Diuris* Pioneer 'Prince' – a superb hybrid from Les Nesbitt. (See article pp 12.) Photo M. Webb.
This hybrid is an example of the problems which may arise from the reinstatement of taxa or the introduction of new taxa resulting from elevation from varietal level. *Diuris* Pioneer was registered as *D. macullata x D. longifolia*. The second parent was *D. longifolia* var. *corymbosa* which has been reinstated as *D. corymbosa*. Thus this hybrid is in fact unnamed as the name *D.* Pioneer belongs to the cross as registered -- a cross which may not have been made as yet!

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Editorial

Springtime - How sweet it is!

In the words of the song - "Spring is just around the corner!". In the minds of many people, Springtime is when we reap the rewards of all the care and attention we have lavished on our orchids during the previous year. And again this year, that is what Spring heralds - a good blooming of our native orchids. But this year, Spring also announces two events of some importance to native orchid growers.

Firstly, this issue of *The Orchadian* is the first of the new look journal: smaller in size, improved in layout, easier to read, and still chock full of interesting articles, news, and views on Australasian native orchids. Over the past two years, with the efforts of our contributing authors, with assistance from our Associate Editors, with the perseverance of the Council of ANOS, and in receipt of a gracious financial grant from The Australian Orchid Foundation, Allison Webb, Mark Webb and I have been able to settle into a pattern for the contents for *The Orchadian*.

Now, with a change in the time at which *The Orchadian* will be printed, we will be able to offer our readers more timely articles. All issues will continue to contain a balanced mix of articles of scientific, cultural, and general interest nature. However, it is the content of the general interest articles that interest me here. In the first and second issues of the year, due out in late Summer and late Autumn respectively, the general interest articles will concentrate on views of interest to all orchid growers, such as conservation, and news of coming events, such as the Autumn and Winter shows. In the third issue of the year, due out in late Winter, you will receive reports of the Autumn and Winter shows, and news of the coming Spring and Summer shows. The final issue for the year, due out in late Spring, will feature general interest articles on the Spring Shows.

This issue is the third issue for the year, and so contains news of the coming Spring events, paramount amongst which is the First Australasian Native Orchid Conference to be held in Wollongong from September 27 - 30th, 1990. And that is the second event of importance to native orchid growers. Never before has there been an Australia-wide, no make that world-wide, conference devoted solely to the orchids which are native to Australia, New Zealand, Papua New Guinea, and the island nations of the south-west Pacific.

The list of guest speakers is formidable in itself. It features authorities on the culture and hybridisation of Australasian native orchids, and on the taxonomy and distribution of orchids in Australia, New Zealand, Papua New Guinea, and the south-west Pacific. The final day will be devoted to the problem of conservation and the implication of CITES. Compulsory reading for this last day should be the series of articles which appeared in the January, 1990, issue of *The American Orchid Society Bulletin*, to which I referred in my previous Editorial. Get out those articles and read them again. You will be better prepared to take an active part in "The Conservation Day" promised for Sunday, September 30, 1990.

The articles in this issue have been specially chosen to give you a foretaste of what might be in store for the people who attend the lecture sessions. In the next issue, perhaps we can include some impressions of the information passed to the people at the lecture sessions, and distilled from the talk at the morning and afternoon teas, and during the various functions of the conference.

For those who prefer orchid shows, the best ever Spring show will be running concurrently with the lecture sessions. It will be big, beautiful, and we will talk about it for years to come. And how we fit the report of that show into the late Spring issue of *The Orchadian*, along with the report from the lecture sessions and the reports from the Spring Shows of the ANOS Groups is going to be our problem. How sweet it will be to have so much to report about!

See you there - in Wollongong - in Spring!

Noel Grundon.

Desert Island Discoveries – Orchid Hunting on a Coral Island

P.J. Cribb
*Royal Botanic Gardens, Kew,
Richmond, Surrey, England*

"We had succeeded in raising the number of known orchids on Rennell Island from an initial four species to 22 in a mere five days."

If the arrival of the motor car can be taken as a sign of contact with the developed world, then there can be few places as cut-off from modern mechanised life than the remarkable island of Rennell in the Solomon Islands. Rennell is a large island, 86 km long and over 15 km wide, yet its total transport facility comprises an old tractor that only runs when the necessary spare parts can be flown in from Honiara, the capital of the Solomons over 200 km to the north. In many ways, the resulting slow pace of life makes Rennell an ideal refuge from the hustle and bustle of life of most other places. Besides that, it is a remarkably beautiful island, untouched as yet by the development that has spoiled so much of the south-west Pacific in the form of tourist complexes, logging, mining and the like.

Below: Green monitor lizard on an island in the lake

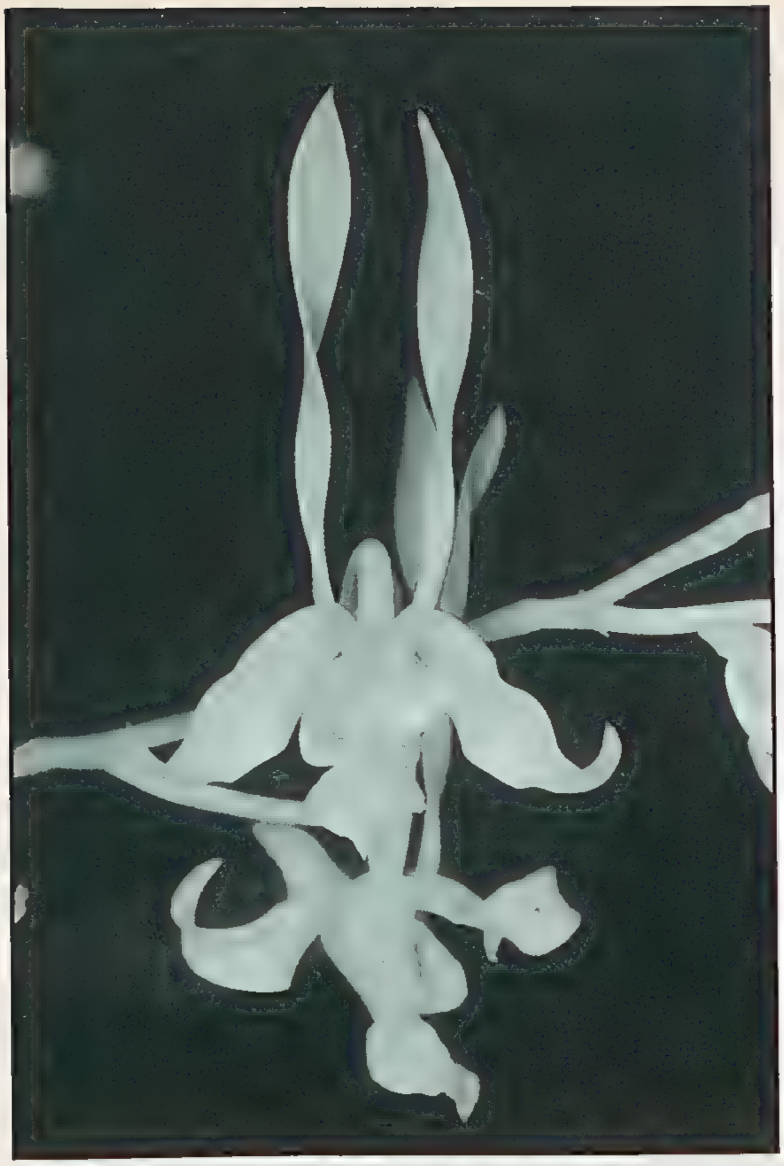
The Island

Rennell is the most isolated of the larger islands of the Solomons archipelago, lying in the Coral Sea some 168 km west of San Cristobal, 181 km south of Guadalcanal, and 1600 km northeast of the Queensland coast. The geology of the island is an object lesson for even the amateur in demonstrating how an island can be formed by the raising of a coral reef above the sea by volcanic activity. Rennell is in fact, the largest raised coral atoll in the world, 825 square km in extent, with cliffs up to 110 m elevation in an almost continuous line around its coast. The surface of the island is an exposed cavernous pinnacle of limestone, the remains of the old reef, and it has been eroded into typical carst formations by the high rainfall. Soils are thin and red over much of the island, and only in the west are there areas large enough for sizeable cultivation of coconuts, breadfruit, papaya, taro and yam. Despite this, the island is covered by a dense tropical forest with a canopy averaging 20 m high, but with much larger emergent trees well represented. The trees root in the thin soils, and often their roots snake over the old coral before disappearing down crevices to search for water below. The forest is reportedly the largest unspoiled tropical rainforest on coral anywhere in the world, and is the home of some 20 endemic birds.

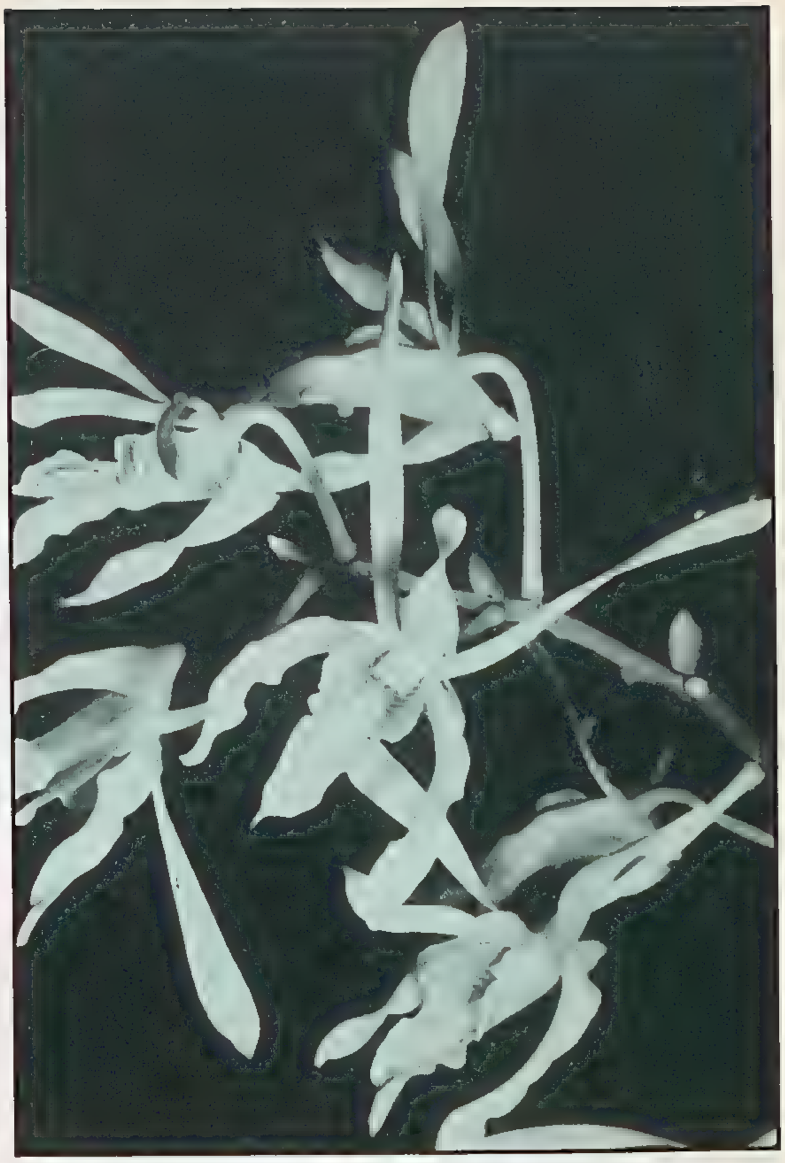
Remarkable as its geology undoubtedly is, Rennell is perhaps best known for the large lake that occupies most of the eastern end of the island. Lake Te Nggano is 28.9 km long and 10 km wide, the largest enclosed body of water in the Pacific. The lake is shallow, only some 43 m at its deepest, and is slightly saline. The salinity has been shown to be the result of a 1 km long underwater connection with the sea on the northern side of the lake. Despite this connection, the lake boasts an endemic banded seasnake that in places is found in large numbers. To this idyllic spot four intrepid travellers ventured in early October 1988, to study the four species of orchids, including one endemic species, that had been recorded from Rennell by earlier expeditions.

First Impressions

The easiest and quickest approach to the island is by the weekly plane from Honiara. The flight crosses the high, central mountain chain of Guadalcanal before heading off across the wide expanse of the Coral Sea for Rennell and its tiny satellite island, Bellona. A few years ago a similar flight missed the islands and was never seen again. However, we were



Dendrobium antennatum in flower



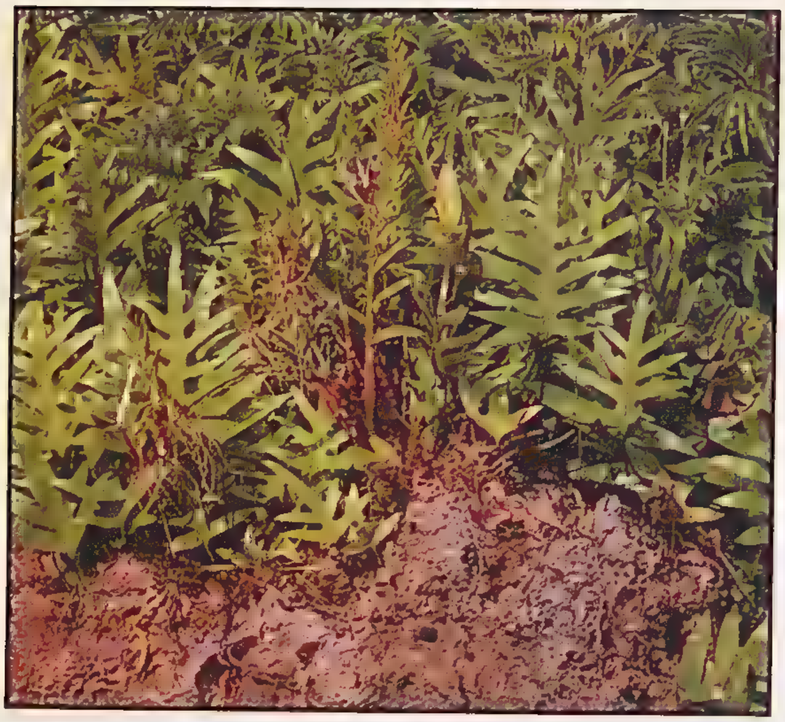
Dendrobium rennellii

more fortunate, and landed in the late afternoon on the grassy airstrip of Tinggoa, almost the only flat spot on the entire island. A two hour delay for the repair of the tractor that was to take us and our luggage to the coast allowed some casual botanising on the fruit trees planted by the airstrip. By 6.00 p.m., we had already increased the known orchid flora by 50%. The fruit trees yielded quantities of the widespread hardcane *Dendrobium antennatum*, carrying copious fruits following apparent self-pollination, and many spider-like plants of the leafless epiphyte *Taeniophyllum fasciola* which is so common throughout the south-west Pacific. Less common on the trees were the one-day wonders, *Dendrobium biflorum* and *D. goldfinchii*, and the ubiquitous *Liparis condylobulbon* that everywhere in the Pacific seems to be self-pollinating. The only ground orchid seen here was a shell-pink flowered *Spathoglottis* that on examination proved to be *S. pacifica*, the first record of that species in the Solomons. It is one of the common species in Samoa, Fiji, Vanuatu, and New Caledonia.

The Journey to Lake Te Nggano

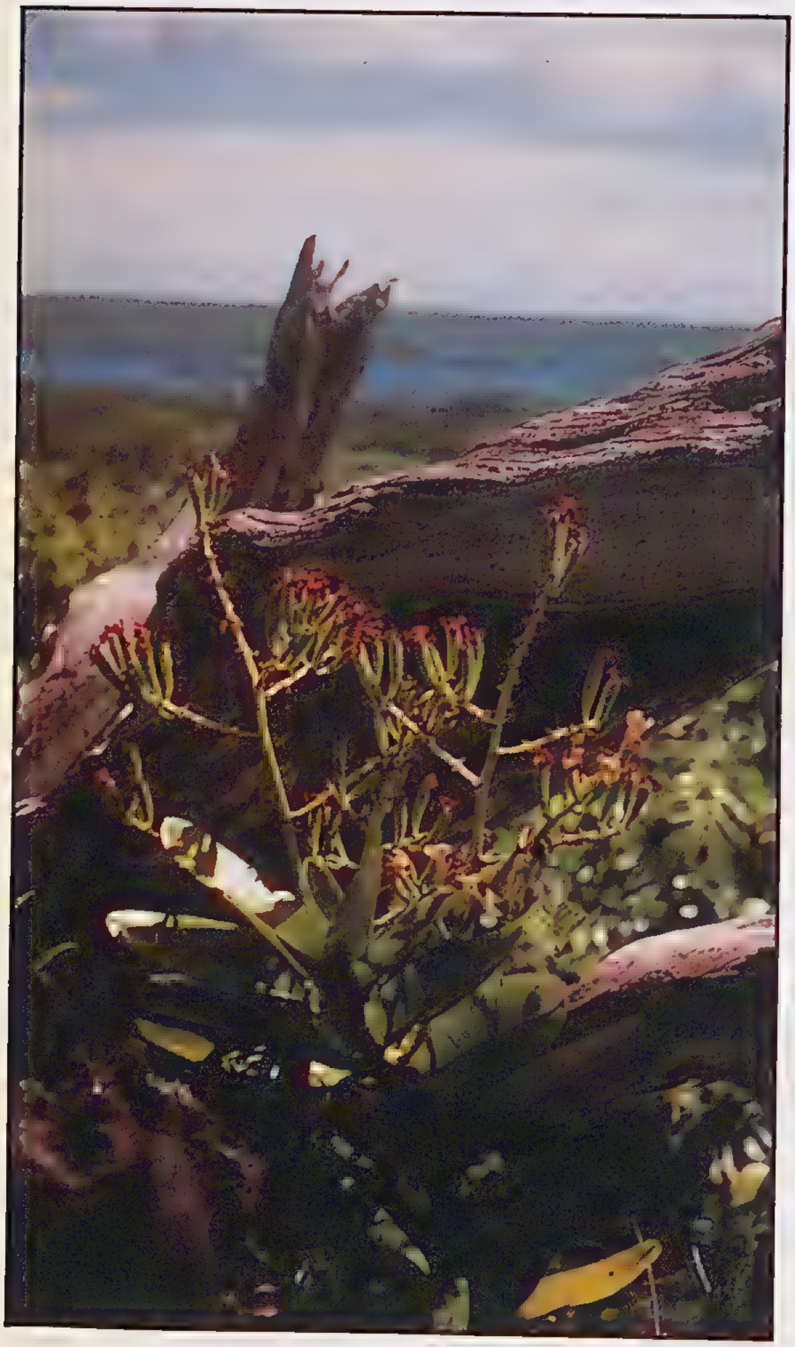
The bumpy ride to Lavanggu on the south coast in the middle of Rennell coincided with dusk and a serenade of fireflies and fruit bats that helped to take our mind off the hazardous, torch-directed journey and our sore posteriors.

Our destination the following day was the northern shores of Lake Te Nggano, but to get there we had to take to a canoe and the open sea. No road yet connects the more populous western end of the island with the Lake, and the track across country is, as we subsequently discovered, almost obliterated by hurricane damage and subsequent neglect. The two hour sea crossing went smoothly until we rounded a headland and the sea began to churn in the rising wind. At the same time, the fish began to bite and the combined excitement of catching barracuda and avoiding being dashed against the reef almost proved too much for the landlubbers aboard. However, we eventually crossed safely and hauled up on the steep sandy beach at Tuhunggango, wondering how we could possibly scale the towering, well-forested cliffs which rose almost immediately



Dendrobium rennellii on a rocky islet in the lake

Sarcanthopsis nagarensis on the cliffs at Tuhunggango



in front of us. The cliff path proved to be a series of over 400 steps, cemented and carved in the limestone, and giving wonderful views down to the turquoise waters of the reef. On the way up, we noticed several fine specimens of the sago palm *Cycas circinalis* with large plants of *Sarcochilus moorei* in bud, and the common *Cadetia hispida* perched half-way up their trunks. The much-needed rest at the cliff-top produced yet more orchids, and an exciting view across to the lake ahead.

On the summit of the cliff, the exposed rocks were covered with large plants of the monopodial orchid, *Sarcanthopsis nagarensis* (better known as *Vandopsis waroqueana*), which also grew on small trees nearby. *Dendrobium capituliflorum* shared the exposed rocks with the *Sarcanthopsis*, while *D. biflorum* and *D. goldfinchii* were also common nearby on the trees.

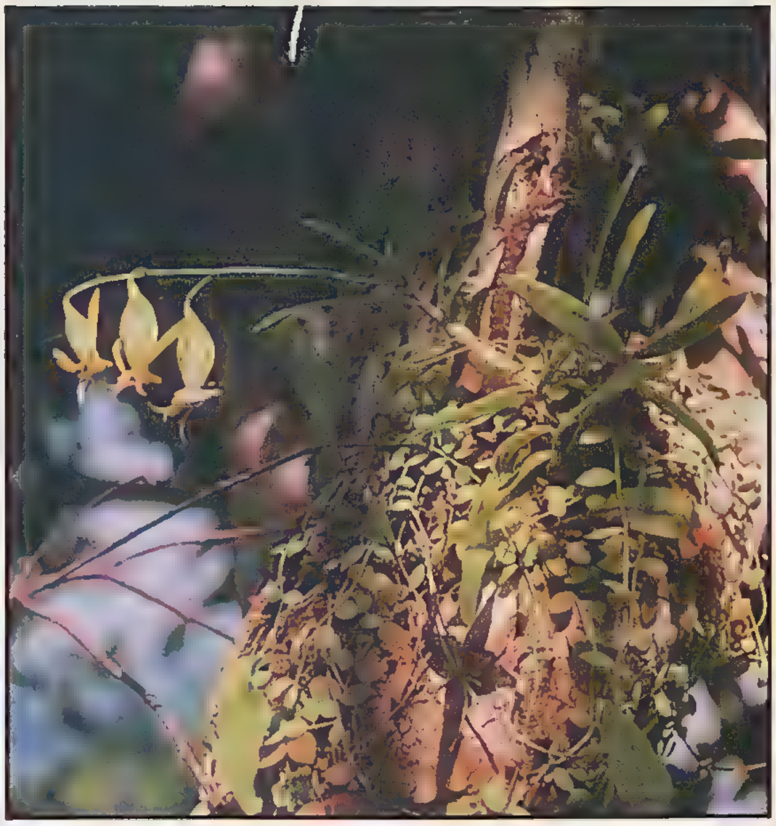
One of the difficulties of orchid hunting in the tropics is the need to keep your eyes on the trees and on the ground at the same time. It makes for slow progress, and often the loss of guides whose ability to stride out barefoot on razor-sharp coral has to be seen to be believed. Nevertheless, a stately progress was rewarded by two new records for Rennell within a few metres of each other in the dense forest just over the rim of the island as we began the hike to the lake. *Didymoplexis pallens* is not a spectacular orchid. It is at best interesting, a leafless saprophyte with two or three tiny, whitish flowers and a lifecycle above ground that is over in a few days. It does, however, have an interesting feature in that the pedicel elongates rapidly to 10 cm or more long after fertilisation of the flower. It was the erect pods on their long stalks that first caught my eye. The second terrestrial here was *Nervilia aragoana* which flowers before its heart-shaped pleated leaf appears on a separate shoot. Both of these species appear to be self-pollinating on the island.

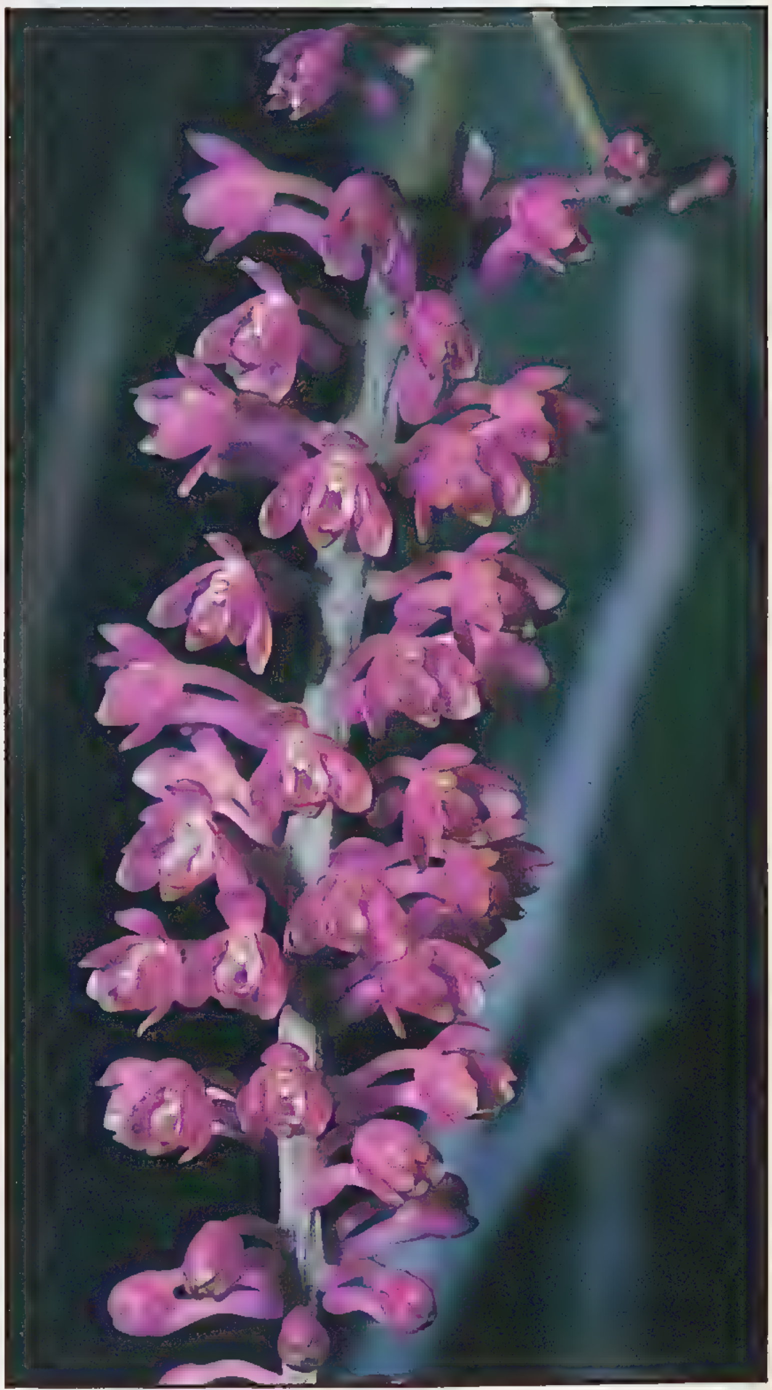
Further along, the track became easier, although the red soil irretrievably stained our clothing, boots and luggage. A few sterile plants of *Corymborkis veratrifolia* were seen by the track. Elsewhere it formed large stands to a metre tall, and is probably the most common terrestrial on the island. *Hetaeria oblongifolia* with tiny white and yellow glandular flowers was also frequently seen everywhere we went. We reached the lake shore just after midday. Our accommodation was a newly constructed and still unfinished resthouse reaching over the edge of the lake on stilts. It was set in the idyllic surroundings of a coconut grove with the waters of the lake stretching in front of us almost to the horizon.

The Lake

I have seldom enjoyed a day as much as our next day on the lake, courtesy of Pastor Soiaka and his canoe with the only outboard motor on the lake. From the resthouse at the western end of the lake, we set out early in the morning to cruise to the southern shore for our first stop at the Seventh Day Adventist mission at Hutuna. This pretty village seemed full of children eager to play football, and show us the refurbishment of the village church using *Pandanus* leaves tied on frames for the walls. The flame trees, *Delonix regia*, planted around the village square were full of large plants of *Taeniophyllum fasciola* to the exclusion of other orchids.

After this brief diversion, we continued down the lake, drifting carefully over the wreck of a Catalina flying boat and several war-time remnants. The forest comes right down to the edge of the lake with trees overhanging the water, and provides few landing places apart from the occasional coconut plantation or village. *Dendrobium antennatum* and the allied *D. sylvanum* were seen on a few of the

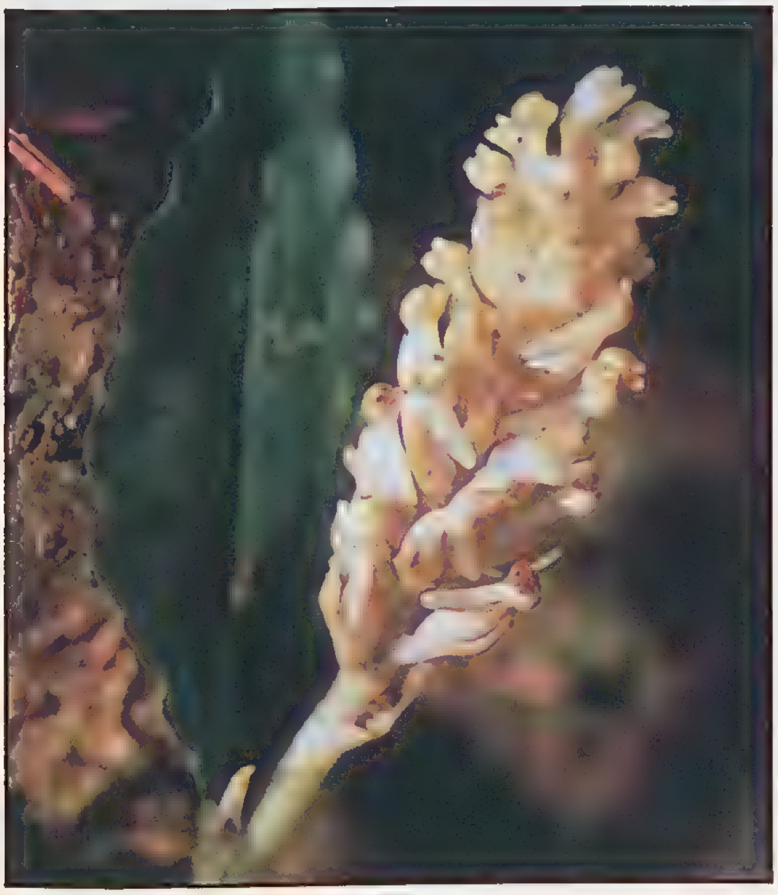


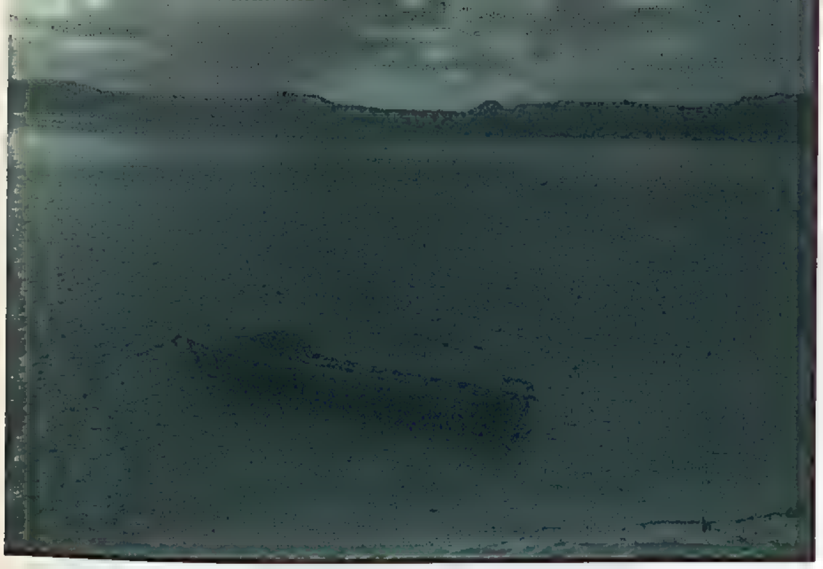


Grower P. Spence

M.Webb

Above right: ***Dendrobium antennatum*** in fruit on a tree by the airstrip at Tinggoa
Right: ***Robiquetia bertholdii***
Below: ***Vrydagzynea salomonensis*** in the forest on the track to the Lake





Canoe on beach on the south west coast of Rennell at Tuhunggango

large trees together with the weird epiphytic ant-plant, *Myrmecophila*. Our main quarry on this trip was to find the endemic hardcane *Dendrobium rennellii* which I had described a few years earlier from a collection made on one of the Danish expeditions to the island in the 1950s. *D. rennellii* is a stunning orchid with yellow canes striped with dark maroon, and pure snow-white flowers boldly marked with purple veins on the lip. The lake is scattered with raised coral islands, and we concentrated our attention on these as the shore looked an unlikely habitat for the orchid. Three hours of fruitless searching passed before we saw our first plants. These were growing perched on one of the few areas of bare rock on a tiny mushroom-shaped island in the lake. The plants were reproducing vegetatively by numerous keikis, but we saw no evidence of seedlings.

D. rennellii is a rare plant hereabouts, and we saw it on only a handful of the many islands we visited. It is a relief that Geoffrey Dennis of Honiara introduced it into cultivation a few years ago, and Phil Spence has subsequently raised seedlings of it from seed sent to him by Hermon Slade. The seedlings grow rapidly and are the best source of the species since wild-collected plants often die from the poor conditions of transit to cultivation.

A few of the scattered islands along the southern margin of the lake are the home of large colonies of inquisitive blue-footed boobies, cormorants and lesser frigate birds. These islands could be smelled from afar, but were well worth the inconvenience to our sense of smell. We also saw here a brightly iridescent, green monitor lizard on the rocks of one island.

At Tinggoa, at the eastern end of the lake, we lunched off coconut, papaya, and *Barringtonia* fruits before walking through the forest to the cliffs above the spot where the first polynesians set foot on Rennell some 23 generations ago. The track took us over jagged coral and through dense forest. *Corymborkis veratrifolia* and *Hetaeria oblongifolia* were common, and we noticed several flowering specimens of *Didymoplexis pallens* on the track. The only epiphytes we saw here were *Dendrobium goldfinchii* and *Robiquetia bertholdii*, a widespread, pink-flowered orchid from the Solomons and Vanuatu. Our return journey across a choppy lake took us past islands and inlets that came straight out of Hollywood's "South Pacific", and will remain a vivid memory for us all.

The Nightmare Journey Back

Our last day at the lake also began idyllically with a canoe trip to the village of Te Vaitahe at the extreme western end of the lake. The water was mirror-calm and crystal-clear as we glided between numerous islands that characterise this end of the lake. A grebe and another monitor lizard were spotted. Many of the islands here have been planted with coconuts, and amongst these were fine colonies of pink and occasionally white flowered plants of *Spathoglottis pacifica*. However, we had to wait until we were within sight of the village before we found a feast of orchids on the trees either side of a narrow channel between two islands. *Dendrobium antennatum* and *D. goldfinchii* were again the commonest species, but several large plants of *D. sylvanum*, and a large clump of *Bulbophyllum polypodioides* coating the trunk of a tree hanging over the water, caused particular excitement. The latter is a new record for Rennell.

The day, however, had a sting in the tail. We intended to walk from the village back to Lavanggu to sample the orchids of the forest *en route*. However, this track is now abandoned as we painfully discovered. First of all we lost our way for two hours, and then found that the track over razor-sharp coral was blocked every few metres by fallen trees. It then began to rain as it only can in the wet tropics. Sodden, exhausted, and hungry, we eventually made the coast in the late afternoon. The journey nevertheless turned up several interesting orchids to cheer us. We added three new records of terrestrial orchids, all seen by the track. The white-flowered pyramidal heads of *Vrydagzynea salomonensis* were not uncommon; a small colony of *Zeuxine montana* was seen once, and a few sterile plants of *Peristylus papuanus* growing in deep shade, brightened one of the later halts (for exhaustion). *Robiquetia bertholdii* and an unnamed *Bulbophyllum* were also seen to add to the increasing list of orchids from Rennell.

Our subsequent return to the airstrip at Tinggoa and departure the following day for Honiara were something of an anticlimax. However, the flight in a tiny plane was a nail-biting affair as dense cloud on the main range of Guadalcanal necessitated a spiralling climb from 4000 to 10,000 feet before we were able to cross it safely. What I could see, and the others could not, was that the fuel gauge read more or less empty as we touched down. A suitable ending you might think to an exciting, memorable and productive adventure. We had succeeded in raising the number of known orchids on Rennell from an initial four species to 22 in a mere five days. Doubtless Rennell has much more to offer from a more leisurely survey.

Postscript

The lifestyle of the Rennellese is under serious threat. They sit on deposits of bauxite that could be mined and their forests are already the subject of overtures from logging companies. The temptation to allow foreign companies to exploit these resources is great. The young men usually leave the island to get work in Honiara, and there see the relative affluence of their fellow islanders. Jobs are hard to come by, and the money that logging companies could bring to the island is considerable. These offers are not just financially attractive. East Rennell is effectively cut off from the western end of the island because of the absence of a connecting road. The logging concerns have offered a road or an airstrip by the lake if the Rennellese concede logging rights. The pros and cons of this dilemma are constantly argued by the Rennellese who feel they have been neglected by the government in Honiara. However, an influential group do not want the islands' forests to disappear as this would change the life style of the people who rely upon forest products for their food and timber for building. They have managed the forests satisfactorily for generations, and do not want to lose them.

One hopeful glimmer has recently presented itself in the form of seedmoney for the development of a specialist tourist industry based around Lake Te Nggano. The lake could certainly sustain low level tourism, but not any great influx of tourists. If the latter happened, then the few habitable sites around the lake would soon be filled with holiday homes. Fresh water might prove a problem. and food would have to be imported. The lake would suffer from pollution, and the wildlife might suffer in consequence.

An islet at the north end of the Lake

Rennell is a unique island whose people lead an unspoiled and peaceful life. It is largely untouched and rich in wildlife, much of which is peculiar to the island. It deserves financial assistance to preserve its unique character, but such assistance can only come from outside agencies. Recently Rennell has been the subject of an approach by the South Pacific Commission. I sincerely hope that a lasting arrangement can be found that will secure the future for the people and wildlife of this unique paradise.

Acknowledgements

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Hybridising Australian Terrestrials

Text by Les Nesbitt
Photos by Mark Webb

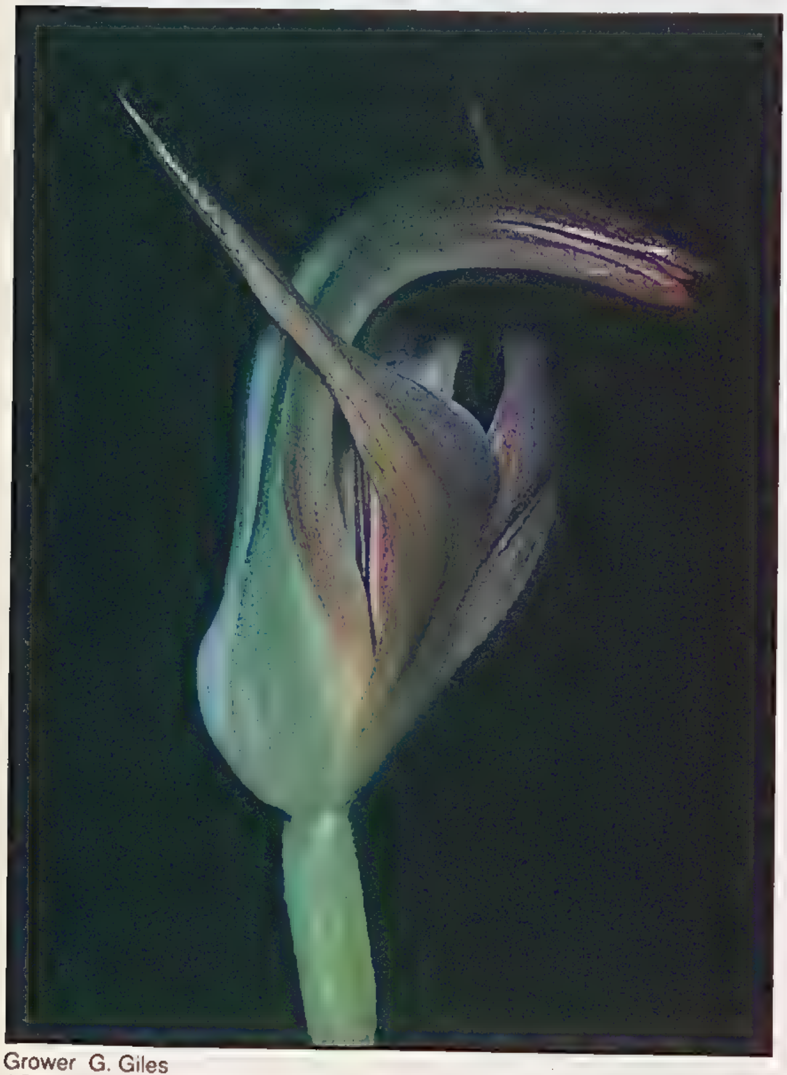
On looking back through my hybrid records, I discovered that my first terrestrial hybrid, made in 1973, was between two *Caladenia* species. At that time, no one could predict with any certainty the result of a primary hybrid cross as there were only a few natural hybrids and the experience of epiphytic and exotic orchid hybrids to go on. The first crosses in the 70's were made between species which happened to be out at the same time with the objective of seeing what the progeny would look like. Seed was produced in the majority of crossings, but the techniques for flasking terrestrial seed were poorly understood, and very few plants resulted.

By 1980, *Diuris* Pioneer (*D. maculata* x *D. longifolia*) and *Pterostylis* Cutie (*P. baptistii* x *P. cucullata*) had been flowered. Both had large attractive flowers on plants which had hybrid vigour and multiplied quickly. More experimental crosses followed with four or five growers in Adelaide making hybrids and collaborating. *Pterostylis* Hoodwink (*P.* X *ingens* x *P. baptistii*) was one of nine crosses I made in 1979. Registered in 1984, it has stood the test of time. Specimen potfuls are seen annually in Adelaide Spring shows.

Hybridising efforts increased throughout the 80's, but in the first half of the decade, problems with flasking seed and transplanting the seedlings to soil severely restricted the number of new hybrids which were flowered. These problems are slowly being overcome, but there is still a long way to go before large numbers of seedlings can be routinely raised from all crossings.

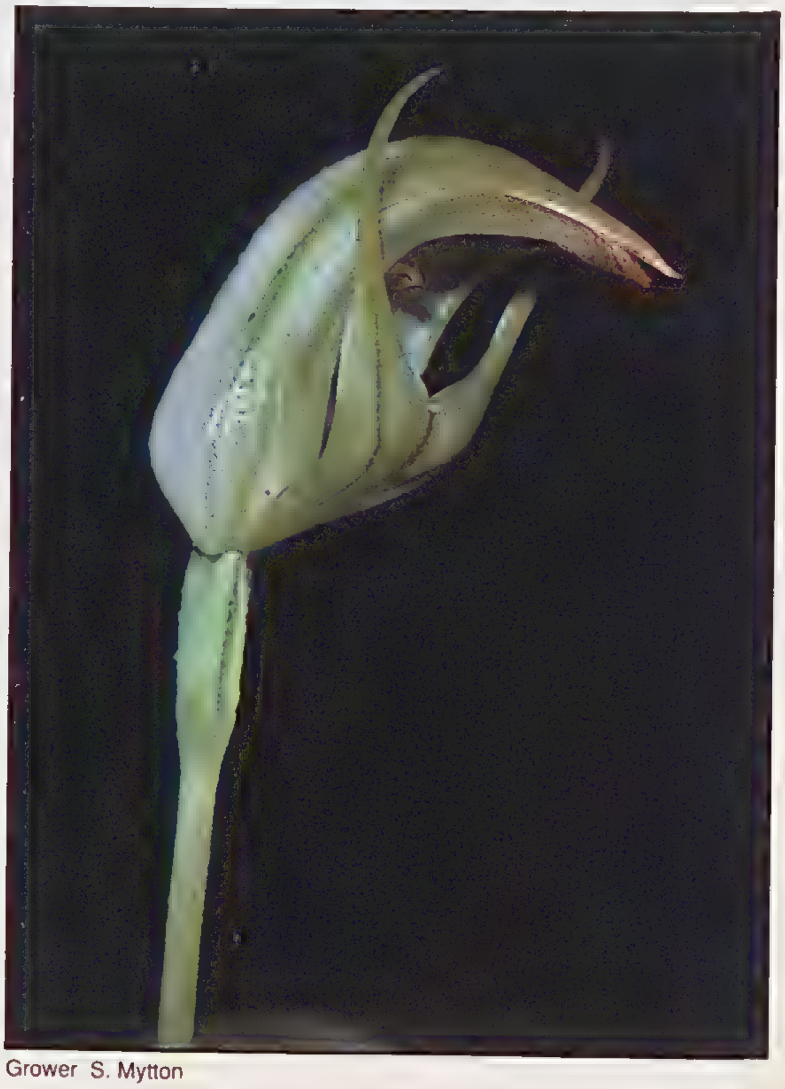
During this period, we started to select what we thought were superior clones of the species and gave them cultivar names. In truth, they are probably hardier clones because they survived and prospered in cultivation. We are only now starting to see the effects particular parent clones have on their progeny. The

***Pterostylis* Cutie**



Grower G. Giles

***Pterostylis* Joseph Arthur**



Grower S. Mytton

hybridisation of terrestrials is about 15-20 years behind that of the epiphytes.

In the last three to four years, a small demand for terrestrial hybrids has emerged. Prior to that time, only species were wanted by growers. This demand will encourage nurseries like ours to continue to produce hybrids. It will also bring obligations to attempt to produce consistently, plants with desirable combinations of characteristics from the following list:

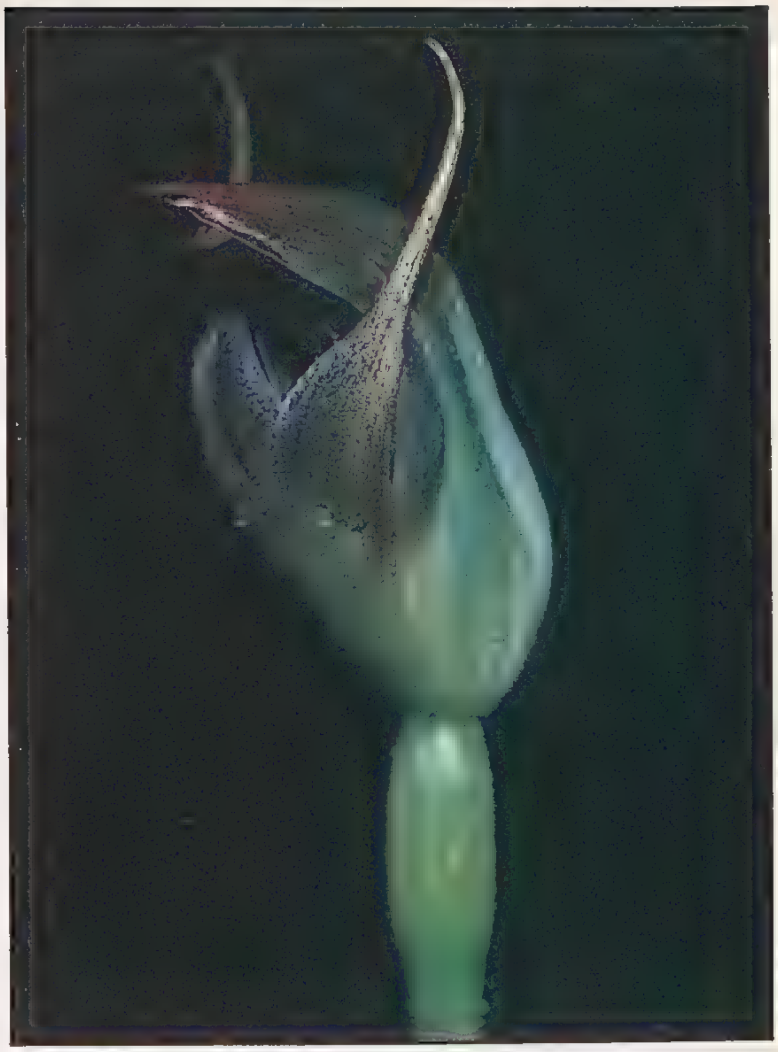
- vigorous, easy to grow plants
- free flowering plants
- fast multiplication; 3:1 or better annually
- attractive colourful flowers which last 10 days or more
- larger flowers on tall, strong stems
- extended range of flowering times
- new shapes and colour combinations
- disease resistance

The greatest advances have been made in the genus *Pterostylis* where third generation crosses are at the seedling stage. Crosses for large showbench hybrids are based on the species *P. baptistii, P. cucullata* and *P. furcata*. These hybrids flower for the spring shows. The autumn flowering cauline type hybrids are more difficult to flower in Adelaide. Our first 100% cauline hybrid, *P.* Sentinel (*P. abrupta* x *P. rogersii*), flowered in 1989. These we call novelty types because they have medium sized flowers with long sepals. Most *Pterostylis* hybrids are in shades of green and white. Crosses to impart brown colouring have been very successful using *P. cucullata* and *P. pedunculata*. The darkest cross so far seen is the cross between these two species, *P.* Chocolate Drop, which has a smallish, very dark flower. There will also be a place for miniature hybrids based on *P. concinna* which imparts vigour and free flowering traits to its progeny. It flowers in winter as do its hybrids.

Diuris is another genus where hybridists have been busy. Unfortunately there are breeding barriers in *Diuris* and many clones are sterile. For example *Diuris* Pioneer will not breed. Difficulties with nomenclature and identification of *Diuris* species makes registration of *Diuris* hybrids awkward, so few have been named to date.

There is tremendous potential in other genera such as *Caladenia* and *Thelymitra* where all the colours of the rainbow can be found amongst the species. The challenge of the 90's is for hybridists to make their dreams come true.

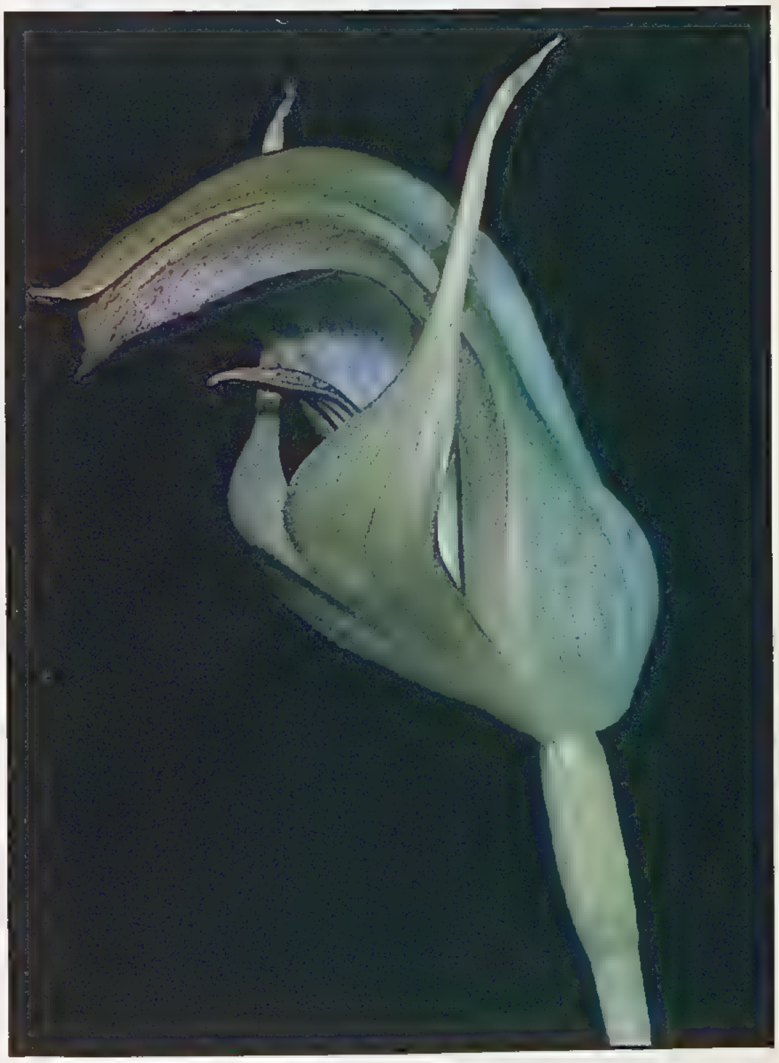
18 Cambridge Street, Vale Park,
South Australia 5081.



Grower S. Mytton

***Pterostylis* Chocolate Drop**

***Pterostylis* Marelba**



Grower S. Mytton

Australian Native Orchids Towards 2000

Ted Gregory,
Merrellen Orchids,
Eagle Heights Qld.

As we hurtle headlong towards the twenty-first century perhaps it may be wise to do a bit of soul searching as to where and what our fabulous Australian native orchids may be at or about when we get there. As I sit here with a scratchy pen on scratchy paper I will reminisce for a while and then gaze the other way with the aid of my crystal ball. (If I can find it.)

Ah! The joys of approaching old age! My teeth are long gone, my eyes are going and my memory is chasing them! Add to this the fact that my wife says my tummy cannot make up its mind whether to station itself north or south of my belt-line and you have the perfect picture of an orchid freak on the track of the next flowering of his pet species. This particular orchid freak has hybrids second on his priority list as our species will always be his true love.

The Gloucester Days

My very first memories of life are of the ranges behind Gloucester during the latter stages of the Great Depression when the national urge was to cut down everything that grew to produce more wheat, wool and wealth for the mother country. And what strange quirk of fate was it that made a certain little boy fall in love with those tiny little plants that were being brought to their doom by the woodman's axe? Looking back now I think it was mainly the love of a mum and dad who would not have harmed Nature in a fit but for the cruel circumstances of the time. And was it luck or what that made these little gems grow like weeds no matter where he planted them? Particularly as his favourite host trees were the large loquats that grew around the old homestead. Looking back now it seems incredible that they did so well beneath that canopy which shut out almost every vestige of light. Orange blossoms, pencil orchids (both vertical and pendulous), greenies and rocklillies all grew with gay abandon wherever said little boy tied them up. My parents must have been both strong and long-suffering as I have no recollection of how some of those huge rocklillies ever got up those loquat trees.

One thing I can remember very well is that there was never any lack of fertiliser for the plants as my parents had an orchard and being on the edge of the rainforest the fruit was attacked all day by the native birds and all night by the flying foxes. At times the orchids were covered in second hand fruit *per* courtesy of the flying foxes. I can still remember the mess and smell on my beautiful plants!

How times have changed! For my ninth birthday I was given a four and a half pound Plumb axe to help with the land clearing; I cherished it then and still do today. If I was to be robbed tomorrow I would rather loose my works of R.D. FitzGerald than my pet axe!

Alas, time never stands still. My brother and sister were growing up and my parents decided to move so we could get some semblance of an education and we ended up on a little farm on Mograni Creek just outside Gloucester township. This did little to kill my interest in orchids as they were thicker in this area than up in the tops where we had lived before. In those days most rock outcrops around Gloucester were loaded with orchids, particularly the Gloucester Bucketts which was the centre of the *Dendrobium kingianum* world to us then. Don't know that I've changed much either!

Here is an aside some may know and some may not: until World War 2 the range was known by the aboriginal word of Buccans; which in the local dialect meant 'great round boulders'. About this time the word was bastardised into Bucketts which has been accepted ever since. My family had local paintings with the aboriginal name on them.

Thinking back to this brings to light some rather cruel memories: the 1975 flood which took my orchid collection also completely destroyed my book collection which contained books from the 1850's belonging to my great-grandfather.

When the war finished the country started to get on with things again and to my way of thinking nothing of great import happened until we get to the Ira Butler era. Looking back to these times the great difference to me is peoples' attitudes; in those days there was little or no commercial interest; people were only involved in native orchids more or less for love. I think this applied to Nicholls, Rupp and all the other 'greats' of this era: most were there just for the love of orchids. Even after

Ira's passing one could buy a carload of orchids for what one would pay for a flask at the present time.

The Future

And after all this trip down memory lane, what of the future? I think this all depends on two words: **peoples' attitude.** With the ability of the modern 4-wheel drive vehicles to go almost anywhere and the amount of forest road that is about now, our orchids are in for a hard time unless we can talk sense into this generation and more sense into the next. Already I see signs in a lot of children that they will have far more sense of the environment than their parents ever dreamed of.

On the other end of the spectrum we still have the type that thinks of every keiki as a dollar or fifty cents of easy money; and it only takes one or two of these to strip out a patch of *Sarcochilus hartmannii* or similar species.

I guess some will say I have a vested interest in driving people to buy their orchids at nurseries, but I hope anyone who knows us would think differently: in fact, in the old days we began breeding the plants and giving them away in the hope we could cut down the thieving from the bush.

This also perhaps explains why the species have held my interest more than hybridising. I feel rather guilty about the way the white man has treated our plants and would hope that I can do a little bit towards keeping Nature going on her own course rather than seeing her abandoned completely.

Nothing in Nature is static. As an example some people say that in a thousand years or two *Dendrobium X delicatum* will take over from *D. kingianum* because of it's hybrid vigour; perhaps in that thousand years time it would be recognised as a species in its own right. What's a thousand years in terms of time to Mother Nature? Just the blink of an eye in human terms.

I think it imperative that we carry on growing and improving our native species in captivity; it's the only chance they have as we have already broken up the ecosystem so badly that the natural chain of evolution is becoming shattered.

We must also be sure to try to maintain what is considered the norm of the species; not what man thinks is the norm but what Nature considers to be that norm. That fabulous clone which wins all the shows could easily have odd ploidy and not be of much use to Nature in the long term scheme of things. Whereas that droopy, little clone on that other rock that we've all overlooked for years could be full of the genes that she has set her heart on using.

I guess it sounds a bit like preaching to the converted but I think most genuine native lovers have the same long-term goal: that is to see their hobby prosper and be accepted nation-wide; and hopefully our first Conference will go a long way to helping achieve most of the goals I have been romancing about on these pages. See you at Wollongong!

And before I go; wouldn't it be wonderful to have 10,000 members of ANOS. Hope that's my crystal ball working, not my thinkbox slipping another sprocket!

R.D. FitzGerald – David or Desmond?

On the ninth of May I was fortunate enough to meet a gentleman by the name of John Whiting, a friend some years ago of Robert FitzGerald, the son of R.D. FitzGerald (1830-1892) who, it goes without saying, needs no introduction.

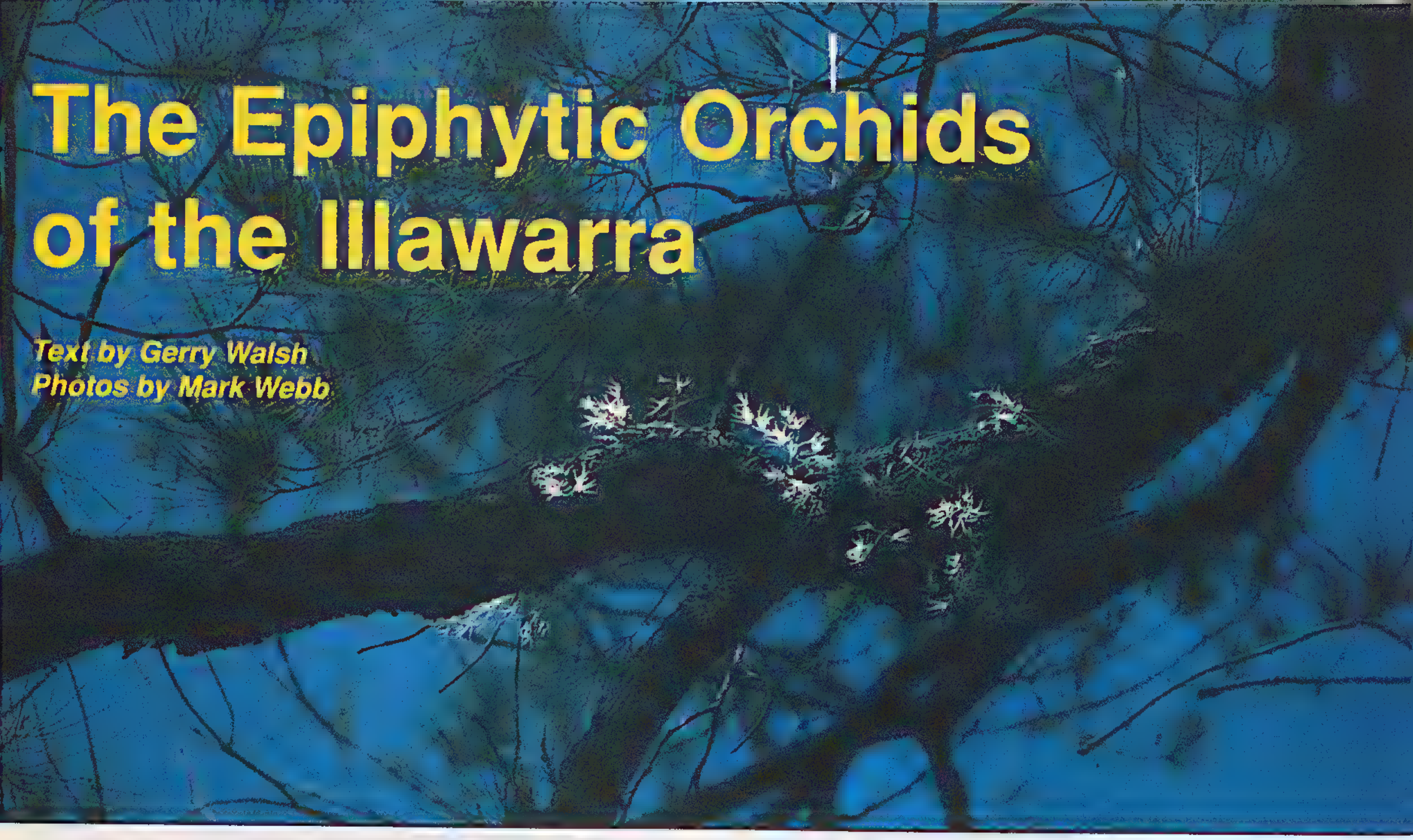
As the conversation ensued, I learned that Robert FitzGerald's wife was still very much alive and regularly played cards with John's wife at their home in Woolwich. I seized the opportunity to ask of John a favour. Some years ago, I noted a discrepancy in various literature as to R.D.'s middle name. Usually quoted as David but often as Desmond (e.g. Rogers, 1911). I asked John if he'd be so good as to check with Robert's wife (R.D.'s daughter-in-law) so as to be able to correct this confusion.

Within a week John rang to inform me that Desmond was originally a printing error from the mid-1880's and so "RD", as he was known to his friends, was Robert David FitzGerald FLS.

Peter R Lister, Faculty of Horticulture
University of Western Sydney, Hawkesbury.

The Epiphytic Orchids of the Illawarra

Text by Gerry Walsh
Photos by Mark Webb



This is the second occasion that I have put pen to paper to describe the epiphytic orchid flora of one of Australia's most beautiful regions, the NSW Illawarra. In 1982, I did so because there had been no previous article published in *The Orchadian* on the subject. I believed that the Illawarra supported a superb orchid flora which warranted recording.

In the introduction to that article I proclaimed that "for sheer orchid quality, I must rate the Illawarra very near the best region of all". And so, after having been asked to do it a second time for this issue, I thought it prudent to review the original article and take it from there.

Little has changed. I remain steadfast in my original convictions: the quality of the Illawarra epiphytes is indeed something to sing the praises of. At this point I had best define the word "quality". By quality, I mainly refer to vegetative characteristics of the orchids, and not so much to the floral attributes such as shape, or size, or other aspects of a bloom that can make an orchid judge either dribble or wail.

Such aspects are merely the product of accidental parentage, and huge variations occur on plants of the same species growing side by side. There will always be a percentage of plants in a colony that appear to be superior in quality. But this cannot be tied to the prevailing environmental conditions. Floral quality is, naturally enough, superior in some species as I will point out.

Vegetative characteristics on the other hand can be attributed to environmental factors. The environment that exists in much of the Illawarra would appear to be very conducive to excellent orchid growth.

The Illawarra

While dealing with definitions perhaps I should state just what geographical features constitute the Illawarra. Broadly, the Illawarra extends from Stanwell Park, on the coast 50 km south of Sydney, to about Ulladulla, which is on the coast some 200 km south of Sydney. The major cities of the narrow coastal lowlands are Wollongong, Kiama and Nowra. Running parallel to the coast is the Illawarra escarpment which ascends abruptly to an average altitude of about 700 m.

These highland areas consist of two distinct geological formations. In the northern half of this zone, sandstone and its associated vegetation predominate. The vast majority of this habitat is Water Board catchment reserve.

Above: ***Dendrobium linguiforme*** growing on *Casuarina cunninghamiana*

Right: ***Dendrobium speciosum* var. *speciosum*** on a rock

The central section is characterised by rich pastoral land on both red and brown soils, probably of volcanic origin. The main towns of these tablelands are Bowral, Mittagong and Moss Vale.

The southern section begins on the flood plains of the Shoalhaven River, which is the only major river system of the Illawarra, and gradually returns to a sandstone flora interspersed with pockets of volcanic origin, particularly around Milton.

Quite a few of Australia's orchid species reach their southern limit of distribution in the Illawarra, mainly because this is also the southern limit of subtropical rainforest. The rainforest grows here primarily because of the high rainfall enjoyed over most of the Illawarra. The rain is spread more or less evenly throughout the year. The small town of Robertson is amongst the highest rainfall registration towns of NSW. Rich soils also account for the rainforest development along with mild winter temperatures.

The Orchids

There are 19 species of epiphytic orchids which occur naturally in the Illawarra, along with one natural hybrid, this being *Dendrobium pugioniforme* x *D. striolatum*. This hybrid has only been recorded once to my knowledge, but it may occur more frequently because of the abundance of both parents.

Dendrobium speciosum Smith

D. speciosum var. *speciosum* is very prevalent in the Illawarra, and in my opinion, its vegetative and floral attributes completely outshine plants from anywhere else in NSW. There are places in the Illawarra where *D. speciosum* adorns the rock faces for a hundred metres or more.

The best plants are nearly always found on the huge, house-sized boulders found below many an Illawarra cliff face. Here can be found gigantic clumps consisting of perhaps a hundred pseudobulbs. Clumps with massive 'canes' can be found in such areas, but it is the thickness of the pseudobulb that can make Illawarra plants stand out. Many are swollen to 8 cm in diameter at their base, and up to 50 cm high to the first leaf. On two occasions I have found plants with six leaves instead of the usual maximum of five. Six leaves are occasionally encountered in *D. speciosum* var. *hillii* but is very rare indeed in *D. speciosum* var. *speciosum*.

I know of several locations where floral quality is absolutely superb over a large area, and not just in occasional clones as is often the case in other regions. The best clones I have seen have flowers up to 75 mm from top to bottom. And the texture of these is fantastic -- the best I have encountered for *D. speciosum* from anywhere. Without a doubt this orchid is the most meritorious native species inhabiting the Illawarra.

Dendrobium aemulum R.Br.

D. aemulum is distributed widely in the Illawarra, but my observations suggest that it shuns the coastal plain. In fact, I have not seen it near the coast at all. All specimens I know of grow either in the sandstone areas of the tablelands or on the low country around the Shoalhaven River, well away from the coast. In the extensive Kangaroo Valley system, where I grew up, I have never seen a single plant of *D. aemulum*. This has always mystified me because *D. aemulum* is a rather cosmopolitan species which does not exhibit such selectiveness in regions north of the Illawarra. I think that it is probably more widely distributed than my observations suggest. Both the rainforest and the ironbark forms can be found in the Illawarra.

Dendrobium linguiforme Sw.

D. linguiforme is another very common orchid in the Illawarra. The most common host is the river oak,*Casuarina cunninghamiana*, but plants are often seen on other hosts. It is also very abundant as a lithophyte.

The biggest, fattest plants of *D. linguiforme* are seen on the ancient River Oaks which line the banks of many of the larger rivers and creeks, particularly in Kangaroo Valley. The sandstone areas appear to support the biggest colonies of lithophytic *D. linguiforme*. It is not uncommon to see three square metres of *D. linguiforme* tightly clinging to a suitable rock face.

Dendrobium pugioniforme Cunn.

The dagger orchid, *D. pugioniforme*, achieves its handsome best on the trees and rocks of the Illawarra, and is a particularly common species. The pendulous stems can be readily observed in the rainforests where it festoons the trees and carpets many square metres of cliff face and mossy boulders.

In some instances, where *D. pugioniforme* has colonised a rockface with high exposure to sunlight, one of the greatest sights in the orchid world can be viewed. One spot I know would have fifty square metres of *D. pugioniforme* adorning its rocky battlements. When it flowers in spring there must be endless thousands of highly scented blooms on board. Because of its preference for dark, cool environs, this species is basically a shy flowerer. But when growing in exposed locations it can bloom profusely. A sight to behold!

D. pugioniforme shows a distinct preference for the rich soil types, such as occur on the escarpment and some of the highland plateau areas. It is far less common in the sandstone areas, but not altogether absent. It is particularly at home in the larger, cascading mountain gullies. To my mind, *D. pugioniforme* is one of the Illawarra's most spectacular epiphytes.

Dendrobium striolatum H.G.Reichb.

D. striolatum is another species that reaches its best vegetative development in the Illawarra. I have seen vast amounts of *D. striolatum* from Victoria to the Blue Mountains, and have yet to see clumps that grow as thickly massed as those from the Illawarra.

The ability of this species to colonise an area is astounding. In some parts of the Illawarra, it is possible to follow the cliff rim for hundreds of metres, and never be out of sight of large clumps.

D. striolatum is a lithophyte, but I have seen it scramble on to the thick exposed roots of an ancient eucalypt. *D. striolatum* seems to be spread evenly throughout the Illawarra, and can be found wherever suitable rocky outcrops occur.

Dendrobium teretifolium R.Br.

D. teretifolium is represented in the Illawarra by only one of its four varieties, and that is *D. teretifolium* var. *teretifolium*. Its stronghold is the southern coastal districts around St. Georges Basin, Jervis Bay, Sussex Inlet, and all the associated lakes and estuaries in this district. In fact, any estuarine environment having large specimens of *Casuarina glauca* along its banks is likely to support from a few to dozens of plants of *D. teretifolium* var. *teretifolium*.

It often cascades from its host tree right over the salt water. In keeping with the habitat requirements of this species, it does not occur far inland or at more than just a hundred metres or so above sea level. I have also seen this species on a *Ficus* tree, but it was very close to a tidal lake. I think it highly likely that this species would occur in the northern and central sections of the Illawarra, but have no firsthand knowledge of this being the case.

Dendrobium tetragonum Cunn.

D. tetragonum is sporadic in its Illawarra distribution. While it is very common in the north of this region, if you know where to look, it quickly becomes very patchy further south. Old recordings list it as occurring in the Cambewarra Mountain range just north of Nowra. Over the years I have tramped over a considerable area of this district and have never seen a plant of *D. tetragonum* there. The most southerly area I know of this species growing is inland from Albion Park.

Since 1982, I have changed my views on the habitat preferences of *D. tetragonum*. Back then the plants I was familiar with grew mainly on Water Gum in good light on the banks of creeks. But since then, and with many more exploratory trips behind me, I now know that this is not the most frequent environment. By far the majority of Illawarra plants grow in low to mid-light levels, not necessarily near water, and mostly on *Backhousia* (Myrtle). *D. tetragonum* shows preference for the stouter limbs and main trunk of its hosts. It is definitely in the "sporadically occurring, but may be locally common" category. *D. tetragonum* shuns the higher altitudes and seems to restrict itself to the lower sections of the escarpment.

Dendrobium gracilicaule F.Muell.

W.H. Nicholls, in "Orchids of Australia", gives the distribution of *D. gracilicaule* as 'south to Kiama'. I know of no one who has found a plant of this species growing in the Illawarra. I think it likely that *D. gracilicaule* does not occur in the region at all, and that ancient recordings of it may be just a case of mistaken identity, probably with robust plants of *D. aemulum*.

Sarcochilus australis (Lindley) H.G.Reichb.

S. australis is proving to be an enigmatic species for me -- in the Illawarra at least. As it occurs from the Blue Mountains right down to Tasmania, it must surely occur in the Illawarra. But so far it has completely eluded me! In my 1982 survey of Illawarra orchids, I stated that "I was still hoping to find it". And in 1990 I have to repeat those same sentiments. Offhand, I cannot think of anyone who has found *S. australis* between Campbelltown and the Shoalhaven River. Yet it is a very common species just near Campbelltown. South of the Illawarra, around the Clyde River, it is also very abundant.

It is quite likely to be common in the Illawarra as well -- if only I could stumble on to it. I take some consolation from the knowledge that *S. australis* has a well-deserved reputation for being fickle in distribution, and the on/off occurrence of its colonies. You can literally walk into a large colony of several hundred plants of *S. australis*, and a few metres later you could not locate one to save your life, such is its selectiveness of habitat.

There are creeks in Kangaroo Valley where once I would have bet money on finding *S. australis*. These creeks are identical to those of the Blue Mountains which have impressive colonies of *S. australis*. But each year I explore another one of these creeks and still have not made the 'first sighting'. No doubt, after reading all this, someone will phone up and tell me about vast colonies of *S. australis* growing near Wollongong Town Hall. I'd believe them!

Sarcochilus falcatus R.Br.

S. falcatus is one of the true gems of the Illawarra orchid community. It is a common species and is particularly prevalent around the volcanic regions of the central Illawarra, but is also numerous on many parts of the coastal facing escarpment, particularly by the larger creeks. In the extensive Kangaroo Valley system, it appears to be choosy of habitat, but abundant where it does grow. In the spring of 1989, I found hundreds of plants crowding a very localised section of a creek I have known all my life, but in which I had never before seen *S. falcatus*. On this trip, I had varied my usual route by only a matter of two hundred metres -- and there they were, magnificent!

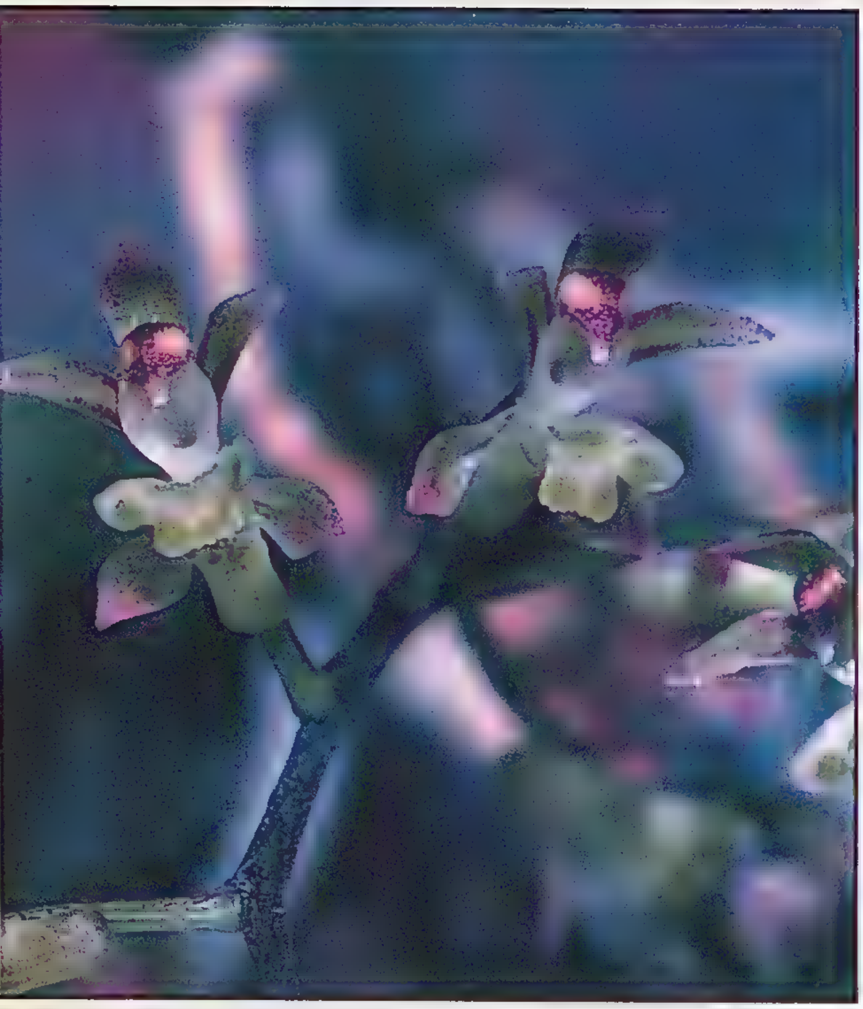
It may be that I am biased, but it is my belief that, on average, both the vegetative and floral quality of Illawarra *S. falcatus* is definitely superior to other regions of NSW. In many of the places I visit down here I seem to see many big, sturdy plants with fat succulent leaves that stay on the plants for years. Specimens with from eight to fourteen leaves hang out of a lot of trees. If the climatic conditions of the Illawarra are responsible for these above average vegetative conditions, then I guess that, over the centuries, the flower size has picked up a little as well.

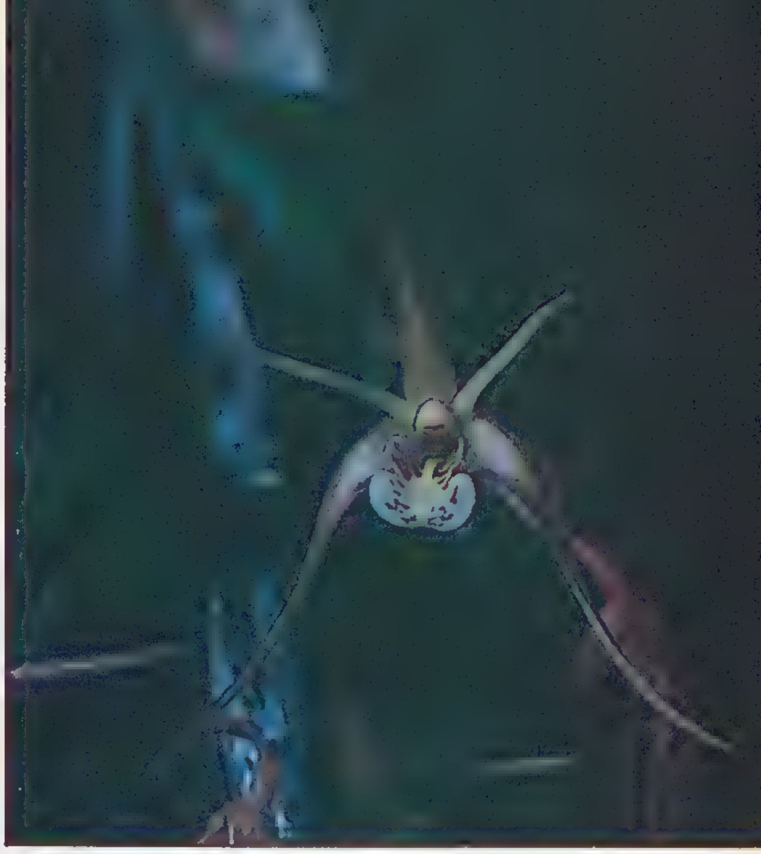
Whatever the reasons for this obvious robustness are, I remain convinced -- Illawarra plants of *S. falcatus* are, on average, the most impressive I know.

Sarcochilus hillii (F.Muell.)F.Muell.

S. hillii is another common inhabitant of the Illawarra, but is often overlooked, even when in flower. It is not as common down this way as it is in the Blue Mountains, and can be difficult to locate. Steep, rocky slopes above rainforest gullies with a good covering of Myrtle are good spots to search for this species.

S. hillii is most common in the sandstone areas of the Illawarra, particularly if these are some distance inland. Around some of the scrubby, drier creeks of the upper Shoalhaven River it is frequently encountered. These are





very similar to the *S. hillii* Blue Mountains stronghold. Personally I have never found *S. hillii* on the coastal escarpment, but it may of course be present there. Many of the largest specimens I have observed were growing on rocks. I suspect that these may have fallen from trees above, and kept growing, rather than actually germinating on the rock.

S. hillii is a species which deserves much more praise than it receives. It provides a fine display of colour at a time of year when most other *Sarcanthinae* species have finished flowering. *S. hillii* can be found in flower until about the end of February. And with its flat, rounded shape and glistening iridescence, it is really a handsome species. Unfortunately, it has a reputation for being a difficult to grow species. In my opinion it is rather a hardy species if kept in good light and a little dry. Iron bark totems are the best host I've grown them on. Just hang them up, no moss or moisture retentive material at all, and forget them.

Sarcochilus olivaceus Lindley

S. olivaceus is a frequently encountered denizen of the Illawarra bush. It tends to be much more common in the sandstone country but is seen occasionally in the rainforest situation. It is seldom found away from running creeks where it mostly chooses Water Gum and Myrtle as a host.

Although nearly always seen as an epiphyte, there are some huge, oversized plants to be seen on rocks. Sometimes the odd boulder will have a dozen *S. olivaceus* on it, but hundreds of similar boulders in the same creek may be devoid of any. The healthiest specimens usually grow in subdued light, sometimes quite low down on the trunk, to within a half metre of the ground. *S. olivaceus* can often develop a very extensive root system if growing on the main trunk of a host, and big specimen plants are often damaged if tampered with.

Pages 20 & 21 Clockwise from top left:
Sarcochilus hillii
Dendrobium tetragonum
Bulbophyllum exiguum
Liparis reflexa
Cymbidium suave growing in the stump of a logged tree
Dendrobium aemulum a small seedling flowering
Bulbophyllum shepherdii
Papillilabium beckleri

Bulbophyllum shepherdii (F.Muell.)F. Muell. (syn. *Bulbophyllum crassulifolium*)

B. shepherdii shows a distinct preference for the larger creeks with big volumes of running water. It tends to shun the higher volcanic regions of the Illawarra. This is another species that seems to be much more abundant in the drier sandstone areas some distance inland. It is seen just as frequently on rocks as it is on trees. Occasionally *B. shepherdii* grows in bright sunny situations where its colouring becomes decidedly yellowish. Quite shady, cool positions near creeks are its preferred habitat however.

Bulbophyllum elisae (F.Muell.)Benth.

B. elisae, to my knowledge, has not been previously recorded as occurring in the Illawarra. While I have never seen it myself, I am reliably informed that it is growing happily in *Ficus* trees in a water catchment area in the northern Illawarra. Because thousands of hectares of catchment are protected by locked gates, and have been for a century or so, *B. elisae* is, hopefully, well-established in this seldom visited sanctuary. It definitely occurs sparingly in the southern area of the Blue Mountains which is only a stones throw west of the northern Illawarra.

Bulbophyllum exiguum F.Muell.

B. exiguum, while not our most impressive orchid species, is certainly at the top of the list when it comes to survival ability. It occasionally makes its home on high, exposed cliffs where ceaseless winds stunt the trees. It gains a foothold in small cracks, and will survive and multiply there in full sun and wind. The moss in which these 'renegade exiguums' grow is often dry and brittle.

B. exiguum is far more commonly seen in the cool dampness of a shady, damp gully. It is common on trees and rocks often forming large, dense mats. It frequently goes unobserved if growing in a large bed of moss. This species does not appear to be particular in its choice of a host tree. Neither does it make any distinction between areas of sandstone or volcanic origins, so long as it has its basic requirements of light and moisture satisfied.

Bulbophyllum minutissimum F.Muell.

B. minutissimum is another Illawarra orchid which I have not personally encountered, but its occurrence in this region is well documented. It is virtually confined to the ancient Figs left standing in paddocks after the onslaught of land clearing operations back in the pioneer days. There are at least three locations where

Figs with *B. minutissimum* growing on them occur within only metres of major roads. I have never heard of this species growing lithophytically in the Illawarra but it may do so. In northern NSW and southern Queensland, *B. minutissimum* occurs extensively on rock but is not often observed because of its acutely small size.

Cymbidium suave R.Br.

C. suave is widely distributed throughout the Illawarra. It reaches its best dimensions on hardwood trees in wet Eucalypt forest but also occurs commonly in very dry, almost heath type country. I have never seen it grow on rainforest species in this region, as I have seen it do on the Mid-North Coast.

Good areas to locate *C. suave* are hardwood forests that were logged before the 1950s. The rotting stumps that have survived are perfect spots for this orchid to germinate and thrive. *C. suave* forms very large clumps, at times around the one metre mark, with many dozens of long fibrous stems.

Liparis reflexa (R.Br.)Lindley

The flowers of *L. reflexa* impress me less than nearly any other native orchid, but not so the actual plant. There are few sights more attractive than a sandstone ledge dripping with water and absolutely draped with ferns and many plants of *L. reflexa*.

The biggest clumps of this species always grow in cool shady conditions but not often in true rainforest environs. It is almost exclusively a lithophyte although on rare occasions plants may be seen on the exposed roots of ancient trees. In the Blue Mountains I have seen *L. reflexa* growing on the trunks of the treefern, *Cyathea leichhardtiana*. It is also frequently seen on exposed cliffs in full sun where it takes on a stunted yellowish-green appearance. It often grows in association with *D. speciosum*. *L. reflexa* is most abundant in the sandstone regions.

Papillilabium beckleri (F. Muell. ex Benth) Dockr.

P. beckleri just manages to scrape into the Illawarra region. It is quite common in the north where it seems to prefer the outer twigs of small trees and bushes overhanging running water. It reaches its greatest size, however, on large wattle trees (which I think may be the Black Wattle, *Acacia decurrens*). These wattles grow away from the creeks but still within the protection of the ridges that surround the creeks. The largest specimens of *P. beckleri* I have seen anywhere grow on these wattles where they are fairly common, if you know where to look. These large specimen orchids are growing on the thick, major limbs and the main trunk in most instances, but also in the much more typical position on the outer twigs.

I am not aware of *P. beckleri* occurring further south into the central Illawarra but hopefully it does. For my money, *P. beckleri* is one of the most appealing species we have in temperate Australia.

Plectorrhiza tridentata (Lindley)Dockr.

P. tridentata is an extremely abundant species over nearly all the regions within the Illawarra with the exception of the high volcanic plateau, where it still can be seen, but certainly not in huge numbers. Wherever a running creek is found you will very likely find thousands of plants growing happily suspended by their haphazardly attached roots. Its preferred host is definitely Water Gum but it often turns up on nearly any other host tree as well as on rocks.

The ability of this species to colonise an area is incredible. On a large Water Gum in a suitable location, seedlings can grow in their hundreds right out to the smallest twigs. Occasional protocorms even pop up on the green leaves of the host. The perfume of *P. tridentata* is incredibly strong and sweet for such a tiny species and this adds substantially to its appeal.

Conclusion

And so ends the list of epiphytic orchids which adorn this most beautiful region of Australia – 19 species and one natural hybrid. So many times it seems to transpire that, after going into print, someone will pipe up with recordings and comments that often contradict the author. This is not something that I mind at all, because by digging out contradictory information we greatly expand the knowledge of and discussion about our native gems.

When it comes to a topic that deals essentially with distribution and habitat, as this article does, there is no such thing as a definitive and final statement. There is always a need for continuing analysis as new snippets of information come to hand.

The facts presented here are drawn, in the main, from my own personal experiences in the Illawarra but I'm willing to stand corrected on all of them. So if you can add to the fountain of knowledge please do so through these pages – and not in the orchid meeting car park.

7 Leslie Court, Werrington NSW 2760

My Voyage through Orchids - Part 1.

G. Hermon Slade

Port Vila, Vanuatu.

I was born in Drummoyne which was then one of Sydney's Western Suburbs, but before my memory started we moved to Roseville, a new suburb on the North Shore railway line. Our home was in Roseville Avenue which ran east from Roseville station, petering out in bushland in Roseville Chase Parkland in the upper reaches of Middle Harbour. We had a live-in house servant, Minnie, kind and gentle but very deaf who needed a hearing aid. In those days it was a flaring trumpet-like instrument that looked like a gramophone speaker that needed to accompany Minnie wherever we went - quite a massive contraption.

I was a difficult child who found that I could attract attention by avoiding eating whenever possible, especially if mother was around. This led to devotion and attention instead of ignoring or even a good gluteal spanking, but this never eventuated: it led to fuss and worry that was exemplified one time, by my being told of a wonderful ''Biscuit Tree'' down in the bush that we might one day visit. The day soon arrived. Down the road we went to the bushland end and after a halt and dispersal a wonderful ''Biscuit Tree'' was found. The carefully decorated tree, adorned with Arnotts' Milk Arrowroot biscuits, which even in those days around 1914 did not interest me in the least, and I disdainfully rejected any offer of the magic biscuits by a scoff and shrug that deserved a good total ignoring to say the least.

While Minnie and mother ate the biscuit harvest I wandered off nearby and found a subject that instantly galvanised me, a wonderful little 'cactus' growing on a sandstone boulder that was later to reveal itself as an orchid, *Dendrobium linguiforme*, I had never seen before and which I instantly wanted to collect and cherish. So away from its rocky abode it was plucked and taken home where it set a challenge because no sandstone boulder existed in our suburban garden. Heaven knows why, but I ended up by placing it at the end of a branch of our peach tree. I visited it regularly and was thrilled to find that it soon sent out roots from its rhizome and had attached itself to the tree, later to become one of my most sought after hosts for many other such plants. It grew, flowered and became a shrine of interest. I can still see it with its delightful feathery flowers trembling in the breeze of warm spring weather. This was the genesis of a lifelong interest.

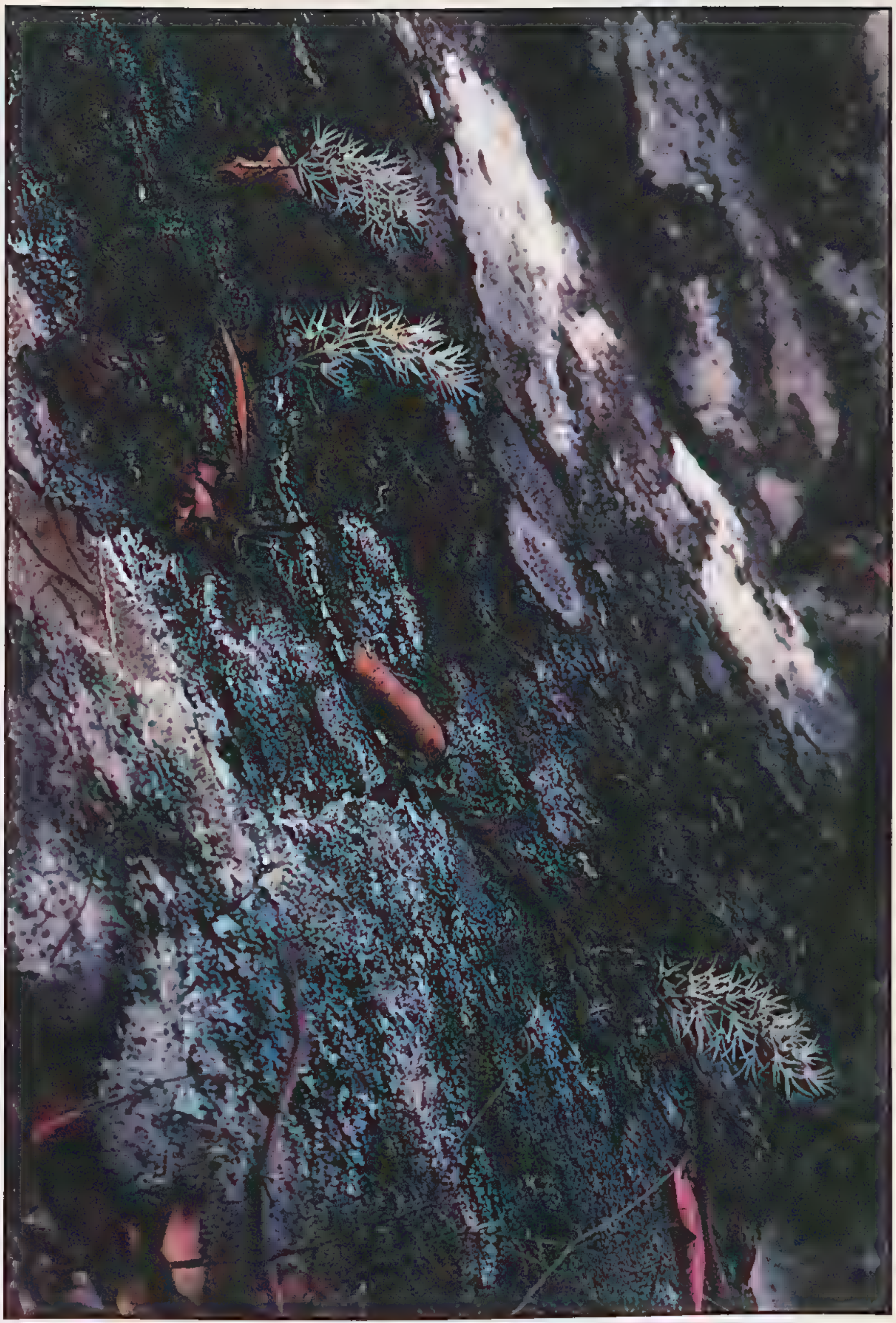
A Paradise of Orchids

A new chapter began in my ''teens'' when I had an invitation to spend Christmas on a dairy farm in Wingham that was romantic, fascinating and altogether wonderful. The farm was of milking dairy cows with accompanying massive talkative bull, about 10 km out of town on the Bulga road. The property, bordered by a creek, was rich grazing land that had been rainforest and by poetic justice and foresight had been left with some copses, islands of ''bush'', consisting of untouched dense scrub left for the cattle to find shade or protection in which to ruminate and escape the noonday sun.

In short time, I found paradise. The garden around ''The Cedars'' had fully grown Jacarandas and other exotics planted with *Sterculia laurifolia* and such beautiful locals, set in a homestead garden of exquisite rural beauty of roses, hydrangeas, azaleas and huge specimens of *Dendrobium speciosum* var. *hillii* in rock and epiphytic gardens that won me over at first sight and still do enchant me. The huge *Platycerium superbum* specimens adorning the Jacarandas and Sterculias exceeded anything I have seen even in famous botanical gardens of global fame. Down in the river were water-rats, very interesting and even lovable rogues and to cap the lot, platypus, not difficult to see and observe if one approached their site quietly and gently.

The best was yet to come. I had not entered the bush copses of shrubs and thorns where the richest interest lay undisturbed. Entering there one day, I found a lithany, a living museum of fascination. By this time I knew orchids as such, but not monopodials and sympodials. Awaiting me here were *Dendrobium beckleri*, *D. teretifolium*, *D. pugioniforme*, *D. tennuissimum* (then only recently described and very exciting) with *Sarcochilus falcatus* in full flower and my first sighting of it, with *Sarcochilus hillii* playing hide-and-seek, but **yelling** with its lovely perfume, and the 'epiphyte of epiphytes', *Plectorrhiza tridentata,* that sends a maze of roots out into the open space and hangs precariously by just one that somehow attaches itself to the tree and supports the ever-swaying and swinging plant below. If there is a skin-of-its-teeth orchid this must be it! Nearby was *Rhinerrhiza divitiflora* with its strange rough roots, in bud but not in flower. I learned that depth of interest and beauty was to be found in unexpected, unpretentious places.

Within this treasury of interest, diversity and beauty there was still more to be found. *Dendrobium tetragonum* with its pendulous pseudobulbs and attractive, perfumed flowers and *Dendrobium gracilicaule* much blessed by attractive perfume although rather suburban in floral extravagance, one of those orchids better anticipated in impatience from far. First met in its full glory that is not all that wonderful after all, except for its midday perfume.


M. Webb

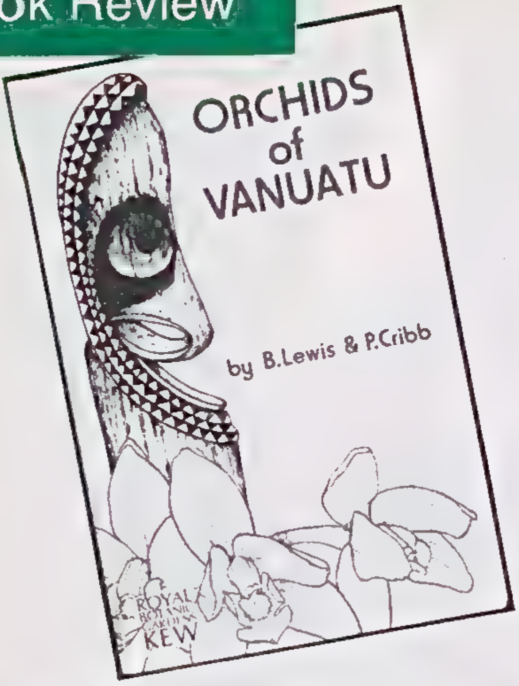
Dendrobium linguiforme 'in situ'

My enthusiasm was at zenith in this wealth of epiphytic interest and diversity to be crowned by a local field enthusiast who led me to another niche I had never seen, the lithophytes. He drove us in a dear old bumpety car to Bulladelah about 35km out from Gloucester. One could actually see a pink suffusion over the rocks and cliffs as we approached them. They were sides of a mountainous cliff simply covered in *Dendrobium kingianum* in full bloom and on searching the spot, it was lithophytic exuberance at its most extravagant. The whole mountain was bedecked by lithophytic life, mainly orchids and these were those specialised for their rocky life. First and foremost, *Dendrobium kingianum* in flower and setting pods, in keikis that were ready to fall off and find a new abode or had recently done so and were desperately trying to establish themselves in the melee of competition, mainly orchids but some other plants both flowering ones and ferns like hare's-foot, themselves lithophytic and non-terrestrial.

I was transfixed and enchanted only to be brought back to earth with a sudden jolt when a huge black snake slid down within inches of my feet blithely wending its way through this rocky wilderness. How I jumped! From Heaven to dear old Mother Earth in an instant.

●

Book Review



Orchids of Vanuatu by B. Lewis & P. Cribb with illustrations by S. Wickison. Published by the Royal Botanic Gardens, Kew, England, 1989. Soft cover, 17 x 25cm. Retail price c.$26 Aust.

The Orchids of Vanuatu was produced as a direct result of the work undertaken by Dr. Phillip Cribb of the Royal Botanic Gardens, Kew, to enumerate the orchids of this area of the world. The major catalyst for this work was Hermon Slade, one of the Directors of the Australian Orchid Foundation and long time resident of Port Vila, Vanuatu.

This book is a flora treatment of the orchids known to occur in Vanuatu. The introduction is excellent as it contains information about the history and geography of the country, the climate and general vegetation. Also included are maps showing the location of Vanuatu relative to other countries in the South-west Pacific Region, and physical geography of the major islands. In addition there are brief sections on the origins of the flora, the history of botanical exploration and significance of the orchids to the region's flora relative to that of other nearby countries. This section concludes with a summary of the distribution of orchids for Vanuatu.

Following the introduction is a summary list of new records and new combinations found in the treatment, a classification of these genera following the 1981 system of Dressler, and a Key to Genera. All are extremely useful when using this text for the purpose for which it was intended; namely a guide to the orchids of the region.

The main body of the text includes the descriptions of genera and species, the distribution of each, habitat and a list of collections on which this data was based. Slightly unusual is the inclusion of data about the Types of all the species and their synonyms as recognised by the authors. Throughout the text there are some rather nice full page line drawings of selected taxa. To top all of this off we are treated to 8 pages of beautiful colour plates of some species found in the region.

This publication has been well thought out and is easy to use and understand. As such it will be useful to all who are interested in these plants, both professional and amateur. The authors and illustrator are to be congratulated for the production of such an imaginative and strikingly distinct cover for this book.

As a preliminary text to the orchids of Vanuatu it goes a long way towards fulfilling worker's and enthusiast's needs.

I have only one major criticism. The taxonomic approach is very conservative, sometimes bewilderingly so. In many cases the name for a particular species is based on a Type from a distant country with seemingly few direct connections as far as distribution of that taxon is concerned, between the source country and Vanuatu. The basis of the choice of many names seems to be the overall similarity rather than definitive knowledge of the taxa involved. One of the cornerstones of taxonomy is reference to the Types. This does not seem to have happened in some cases and there are examples of taxa being reduced to synonyms in this text without the authors having viewed the relevant material or by giving adequate reasons.

I also have one other criticism. Whilst the illustrations are rather lovely, and contribute to the balance of the book, some are technically inadequate for the purpose for which they were intended, *viz* to assist in the positive identification of species. It would have been far better to provide single illustrations of representative taxa in which all the parts and habit of the plant were shown. This would allow a direct comparison of material and assist all who use the book.

Notwithstanding these deficiencies, this is quite a good publication and is also a major contribution towards a better understanding of the Family. I was recently in the unique position of being able to use this book in the field in Vanuatu almost immediately after the book was published. It was very useful in that situation and I recommend it to all those interested in the subject.

Mark A. Clements.

Dendrobium fleckeri and Some Progeny

Reg Shooter
5 Diane Place,
Grange, South Australia 5022.

The Species

Dendrobium fleckeri Rupp & C.T. White is not seen quite as often in cultivation as some other species here in Adelaide. Contrary to what I read, I find it is difficult to cultivate in this arid State. The difficulty is in providing the rather exacting conditions of high humidity, bright light and air movement the species experiences in its natural habitat. It occurs in rainforests on trees or rocks at altitudes above 900m (3000 feet) on the eastern side of Cape York Peninsula.

D. fleckeri was originally collected by Hugo Flecker in 1935 in the rainforest near Mt Spurgeon on the Mossman River and was named in his honour by Rupp and C.T. White in 1937.

D. fleckeri rarely flowers profusely, producing 1-3 flowers on short inflorescences, the flowers averaging 25mm (1 inch) in diameter. The flowers have broad sepals, rather narrow petals, a densely hairy labellum, excellent substance and texture, and a spicy fragrance. The colour varies from yellowish-green through to the more common apricot-yellow. Many of these features are passed on to hybrid progeny.

There appear to be two distinct vegetative forms, one having short, slender, 10cm (4 inch) pseudobulbs. The other is not quite as slender and up to 30cm (15 inches) tall. When not in flower this form can be mistaken for either *D. gracilicaule* or *D. adae*.

Use in Hybridization

Although this species was described way back in 1937, it was not until 1970 that the first hybrid using *D. fleckeri* was registered by Cannons. This was *D.* Hastings (*D. kingianum* x *D. fleckeri*). Both parents have passed on their wide segments with *D. fleckeri* also contributing its prominent labellum and spicy fragrance, and *D. kingianum* an infusion of pink in many instances.

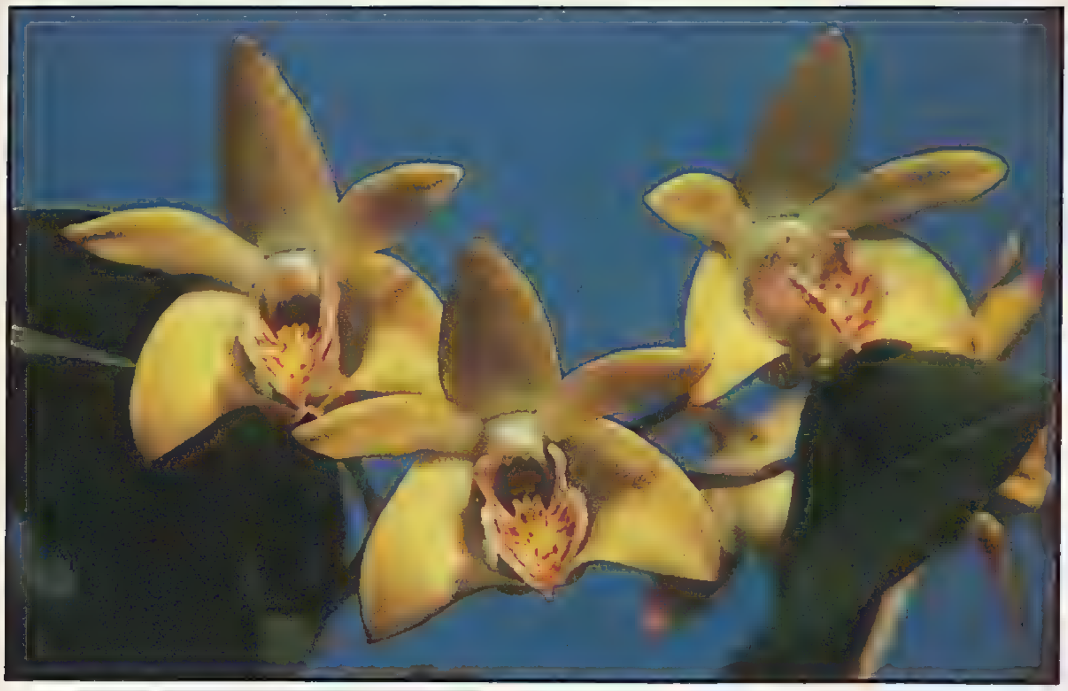
The hybrid *D.* Peter, was registered in 1972 by Roger Bedford. This is a beautiful hybrid, and the mating of the crystalline white, profusely flowering *D. falcorostrum* with *D. fleckeri* produced a plant which is vegetatively midway between both parents. The colour is a lovely soft golden-yellow with a purple, striped labellum.

There was a lull in using *D. fleckeri* in hybridisation until the 1980s. Between 1980 and 1989 a further 9 hybrids were registered with *D. fleckeri* as one parent. These include *D.* Golden Fleck (*D. fleckeri* x *D. gracilicaule*) which is a tall slender plant with *D. fleckeri* shaped flowers exhibiting that hairy labellum and spicy fragrance. *D.* Sunglow (*D. fleckeri* x *D. speciosum*) has deep gold to apricot coloured flowers with up to 9 flowers per raceme. Many clones bloom more than once a year. *D.* Eureka (*D. fleckeri* x *D. ruppianum*) has a flower shape midway between the two parents. Colour varies from cream to a desirable apricot-yellow with a nicely marked labellum. The better clones have up to 20 flowers on erect racemes.

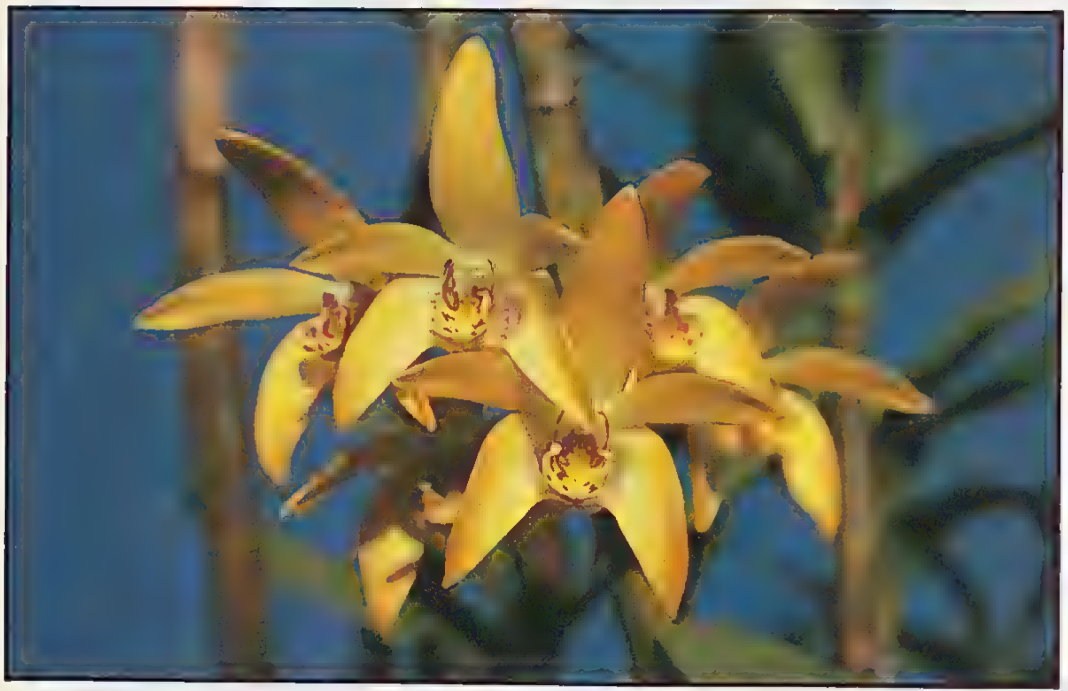
D. fleckeri has been successfully mated with the two Australian species from the tropical section *Phalaenanthe*, *D. bigibbum* and *D. affine*. I have not seen either of the progeny but the illustrations in "Dendrobium Orchids of Australia" by W.T. Upton (Houghton-Mifflin, 1989) looks most interesting. *D.* Big Fleck (*D. fleckeri* x *D. bigibbum*) indicates a flower shape midway between the two parents with the *D. bigibbum* colour predominating. It is reported to tolerate minimum temperatures down to 10°C.

D. Reg Burns (*D. fleckeri* x *D. affine*) has a flower shape which perhaps leans toward *D. affine* with the distinctive purple centre that is so dominant in many *D. affine* progeny. It is reported to carry 14 flowers on an arching raceme on compact plants, and I would think requiring the same treatment as *D.* Big Fleck.

The preceding are, of course, all primary hybrids, but much work has been and is being done by breeding on to a second generation and beyond. Some 90 to 100 hybrids now contain at least one infusion of *D. fleckeri*, many in the third and fourth generation of breeding. As yet many have not reached the commercial market in any quantity, or if they have, the plants have not yet reached their full flowering potential. The next few years



Grower S. Batchelor S. Batchelor



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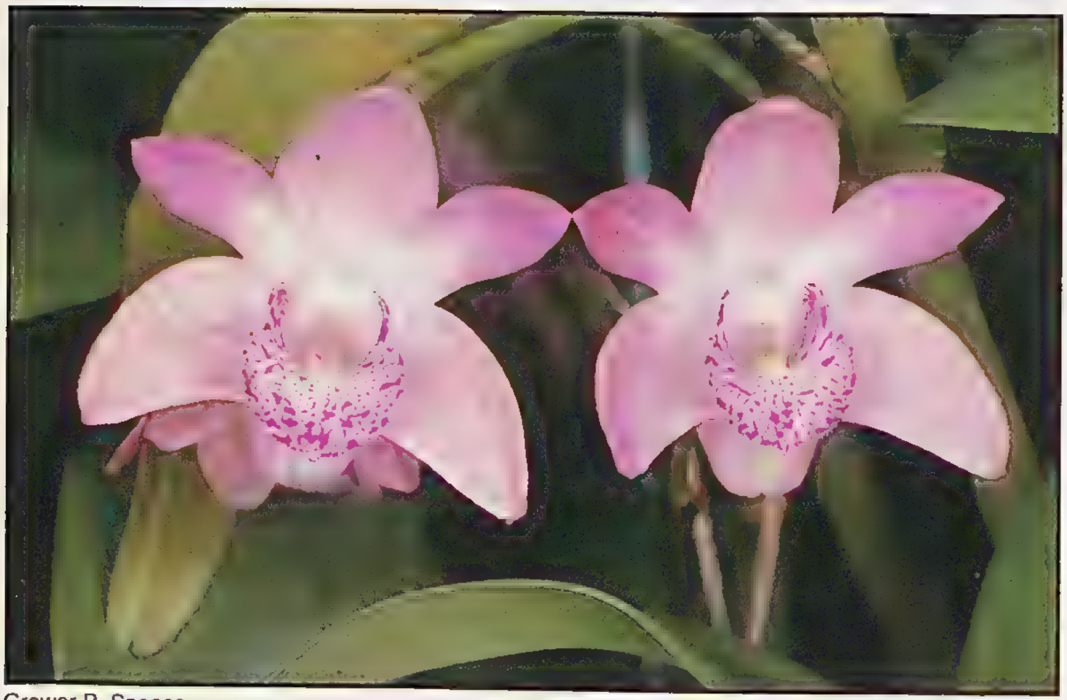

Grower P. Spence P. Spence

promise to be an interesting time for Australian native orchid growers.

Obviously, in an article such as this, all the hybrids containing one or more infusion of *D. fleckeri* cannot be discussed, but a few which have already made an impact are *D.* Wonga (*D.* Hastings x *D. speciosum*) which has large racemes on medium sized plants, the flower colour ranging from cream to a desirable soft apricot-yellow. *D.* Jamie Upton (*D.* Golden Fleck x *D. tetragonum*) has a plant habit and flower shape very much like its *D. tetragonum* parent. My plant flowers more than once a year and has golden-green segments with a broad, flat labellum. *D.* Fiesta (*D.* Kim x *D.* Colin) is an aptly named orchid, the flower being basically pink in colour and suffused with reddish-purple giving a fiesta of colour on small compact plants.

D. fleckeri has certainly come a long way since Hugo Flecker discovered it on top of a lonely mountain way back in 1935. It would be interesting to hear what he would have to say if he could see the results of the hybridists' work on this beautiful species named in his honour.

Top: ***D.* Peach Glow 'Brolga'**
Centre: ***D.* Peter 'Citron'**
Bottom: ***D.* Hastings**

What's On

Events for 1990

Month	Group	Location and Futher Information
September		
8 & 9	**ANOS Warringah Group Inc. Spring Show**	Mona Vale Memorial Hall, Pittwater Road, Mona Vale.Set up Fri 7th Sept. Open 9-8 Sat.,9-4 Sun. C. Arnott, Show Marshal, 971 9173
9	**ANOS Port Hacking Spring Show**	North Engadine Scouts Hall, Old Bush Rd. Yarrawarrah.Show Marshal, Dennis Wood 520 6086. Set up 6.30-8pm Sat. 8th. Open 9.30-5 Sun
15 &16	**ANOS Sydney Group Inc. Spring Show**	Baulkham Hills Community Centre. Show Marshal, Darryl Smedley 639 6846. Set up Fri 14th. Open 9-5 Sat,9.30-4 Sun.
26-30	**First Australasian Native Orchid Conference and Show**	University of Wollongong. Set up 26th Sept. Open Thurs 27 to Sun 30.
October		
6 & 7	**ANOS Vic. Group Inc. Spring Show**	National Herbarium, Birdwood Ave, South Yarra. Helene Wild. 56 Civic Parade, Seaholme. Vic. 3018. 398 2617. Open 11-6 Sat, 9-4 Sun
21	**ANOS Sydney Group Inc. Sarcanthinae Show and Mini-workshop**	Castle Hill Community Centre, Show Marshal Darryl Smedley, 639 6846. Set up Sunday, Open Sunday.

ANOS Awards

***Dendrobium* David Baver 'Monroe'** was awarded an HCC at the ANOS Autumn Show at Kincumber on the 29th April 1990. This plant, owned by Laurie Jarvis, was judged Grand Champion of the Show. The plant was in pristine condition and exhibited two racemes, each of 14 dark, velvety flowers displayed to best advantage.

M Webb

M Webb

Letters

Pat on the Back for *The Orchadian*

In a recent letter from a friend, Mrs. Jo Levy, a prominent and enthusiastic orchid grower and hybridist from Memphis Tennessee, USA, Mrs Levy wrote,

> "...I really enjoy *The Orchadian*, and thank you for introducing me to it. It contains much information that does not appear anywhere else and which I find most interesting...".

Sentiments such as these from a person of Mrs. Levy's standing in the orchid world should certainly encourage those involved in the preparation and publishing of *The Orchadian* -- keep up the good work.

Sid Batchelor,
"Yondi" Baulkham Hills

More on Actizyme®...

I refer to my notes (*The Orchadian* **9**:11, 261-2 (1990)) relating to preliminary trials to examine the effect of using combinations of enzymes to promote nutrients to apparently fungal reliant native orchids.
I have received a number of queries relating to the time frame which was not clearly stated. For the benefit of others who may be wondering,

1. The collection and transplanting of test and control plants occurred in early spring 1987. Only plants which had initiated a flower spike were used and, as would be expected, all plants flowered. Details of the flowering were not recorded as they were irrelevant. The referred to flowerings at the ANOS Warringah Show '88 of *Caleana major* and *Prasophyllum elatum* plus the December '88 flowering of *Dipodium variegatum*, were, in effect, 2nd flowerings.
2. The *Dipodium variegatum* spike initiated in January '90 did produce 15 flowers and a number of those flowers were sent to D.L. Jones in Canberra in late January '90.

This is the first time I have recorded *Dipodium variegatum* or *D. punctatum* producing two flower spikes in one season.

R.J. Angus, DeeWhy

New Hybrid Registrations

from *The Orchid Review* January to May 1990.

Dendrobium		
Jim Duffin	*phalaenopsis** x Baby Doll	Mr./Mrs. J. Duffin (Jones & Scully) 1989
Julieanne Bull	*tetragonum* x *gracilicaule**	K. Bull 1989
Kardinia	Star Delight x Ku-Ring-Gai	R. & D. Sheen 1989
Little Tina	Cascade x *affine*	J. Grezaffi 1989
Pandala	Numkumbil x Ku-Ring-Gai	R. & D. Sheen 1989
Pink Cascade	*Xsuperbiens* x *affine*	D. Loch 1989
Roy Ford	*gracilicaule** x *discolor*	R. & G. Robertson (A. Ford) 1989
Tegan's Delight	Peewee* x *fleckeri*	R. Skaines 1989
Valmai Rose	Kim x Kingrose	A. Peck 1989
Pterostylis		
Chocolate Drop⁺	*pedunculata* x *cucullata*	L. & M. Nesbitt 1990
Marelba⁺	Mary Eleanor x *baptistii*	L. & M. Nesbitt 1990
Rogoff	*ophioglossa* x *rogersii*	L. & M. Nesbitt 1989
Sentinel	*abrupta* x *rogersii*	L. & M. Nesbitt 1989
Sarcochilus		
Olive Nymph	Melba x *australis*	P. B. Adams 1990
Star Struck	Southern Cross x *fitzgeraldii*	R. E. Harris 1989
Thelymitra		
Melon Glow	*antennifera* x *luteocilium*	L. & M. Nesbitt 1990

*Due to the present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review*.

⁺ See photos page 13

In the Next Issue:

- The Orchids of Vanuatu. B. Lewis
- George Caley's Contribution to Australian Natural History. Keith Ingram.
- Thoughts and Observations on Cauline Leafed *Pterostylis*. Peter Eygelshoven.
- *Bulbophyllum digoelense* JJ Sm. NHS Howcroft
- A New *Dendrobium* species
- Conference and Spring Show Reports

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Remember, any articles you contribute will be gratefully received. The greater number of opinions published will be of benefit to everyone and our orchids are sure to benefit from the sharing of knowledge.

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"The Orchids of Micronesia 1914 & 1921"...2 vols.--$21.00
"Contributions to the knowledge of the *Flora of New Caledonia* "--$15.00
and
"New Papuasian Orchids from the text *Neue Orchideen Papuasiens*" -- J. J. Smith--$17.50
"The Native Orchids of Australia" -- D. L. Jones--$69.95
"*Dendrobium* Orchids of Australia" -- W. T. Upton--$69.95
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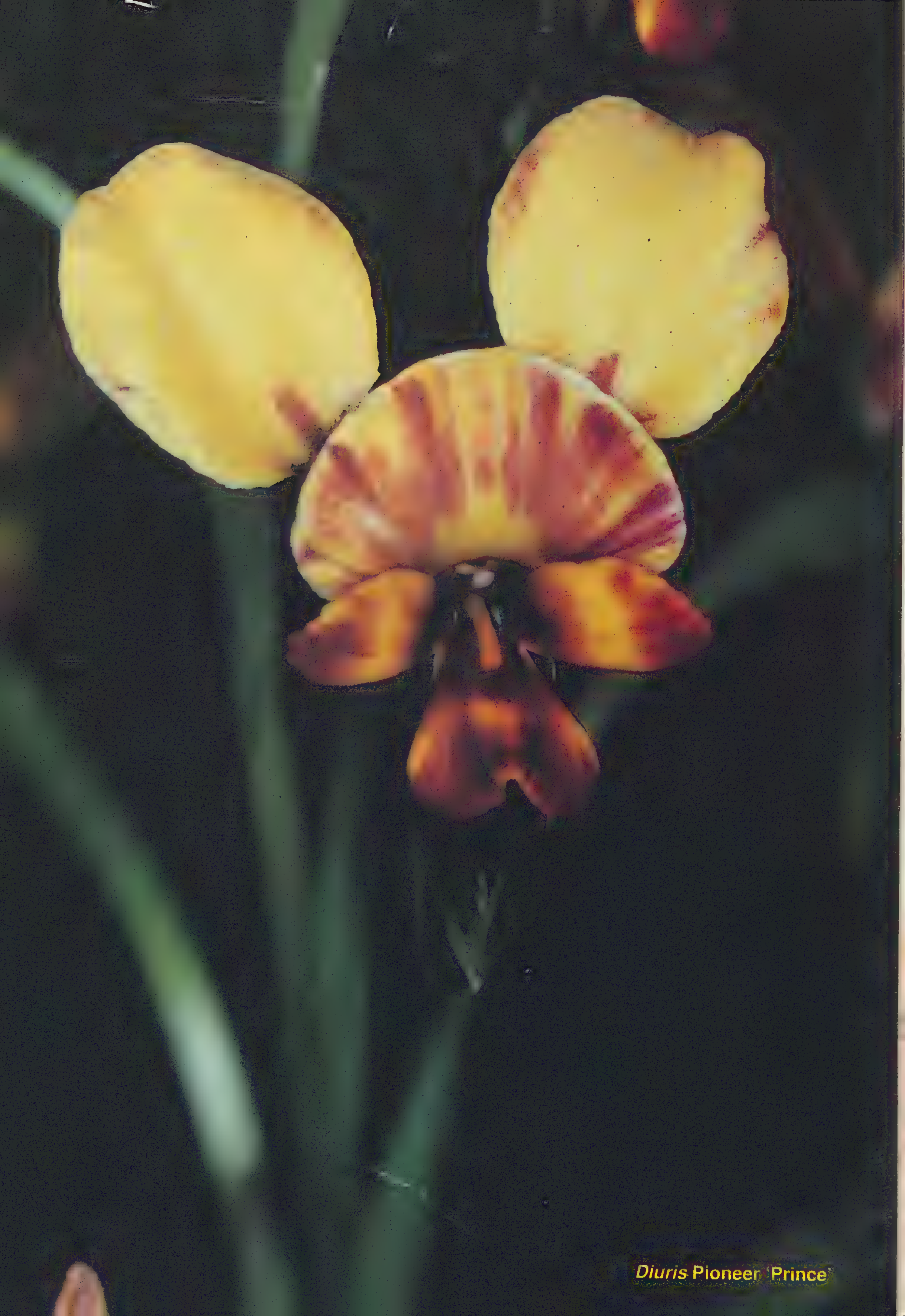

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The Orchadian

Volume 10, Number 2
Summer 1990

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Journal of the Australasian Native Orchid Society

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EDITORIAL

Which scientific name to use?

In this issue, Mr Ron Kerr, makes a plea for *The Orchadian* to use only the scientific names as listed in M.A. Clement's *Catalogue of Australian Orchidaceae.* At the recent First Australasian Native Orchid Conference and Show, I discussed the reasons behind the proposed name changes with Mark Clements and Dr Ben Wallace. I checked with Dr Alec Pridgeon and Dr Phillip Cribb on the policy that would be taken by the International Registration Authority for Orchid Hybrids with respect to the proposed changes in the names of many Australian native orchids. I have also reviewed these subjects with five of the Associate Editors of *The Orchadian*, and have had correspondence from two other Associate Editors on this matter. With this background, I make the following observations:

1. The article, "Catalogue of Australian *Orchidaceae*" by Mark Clements, was critically reviewed by taxonomists familiar with Australian orchid taxa prior to its publication.
2. The name changes proposed by Clements fall into three categories: (a) those caused by genuine mistakes in applying an incorrect name to a species; (b) those caused by failure to apply the Rule of Precedence; and (c) those caused by elevation to species rank of orchids previously classed at lower levels of taxonomy, or by reduction to synonymy of previously distinct species.
3. Clements provides evidence in his catalogue for the reasons behind name changes falling into categories (a) and (b), and there seems to be little concern amongst orchid growers in accepting these changes. I, and the majority of the Associate Editors of *The Orchadian*, also accept these changes.
4. Most of the disagreement seems to involve changes of the type in category (c). Many of these changes are a result of Clements' concept of a species as applied to the *Orchidaceae.*
5. In his catalogue, Clements does not provide the scientific evidence needed to substantiate his concept of a species, nor to justify the proposed names changes of the type in category (c). This evidence will be presented in his Ph.D. thesis.
6. Judgments of the correctness of Clements' concept of a species, and of his proposed changes of the type in category (c), can be made only after consideration of the scientific evidence to justify those changes. Until this evidence is published and accepted by Clements' scientific peers, I, and the majority of the Associate Editors of *The Orchadian*, favour retention of the currently accepted varietal and subspecies names.
7. The International Registration Authority for Orchid Hybrids intends to treat each application for registration of orchid hybrids using the new names proposed in Clements' catalogue on an "individual and separate case" basis.
8. With respect to the use of scientific names in *The Orchadian*, future articles will, for the time being, reflect the views expressed in [3], [6], and [7] above, with appropriate text comments by the Editor when needed.

Noel J Grundon

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ORCHIDS OF VANUATU

B. Lewis
Royal Botanic Gardens, Kew, Richmond, Surrey, England.

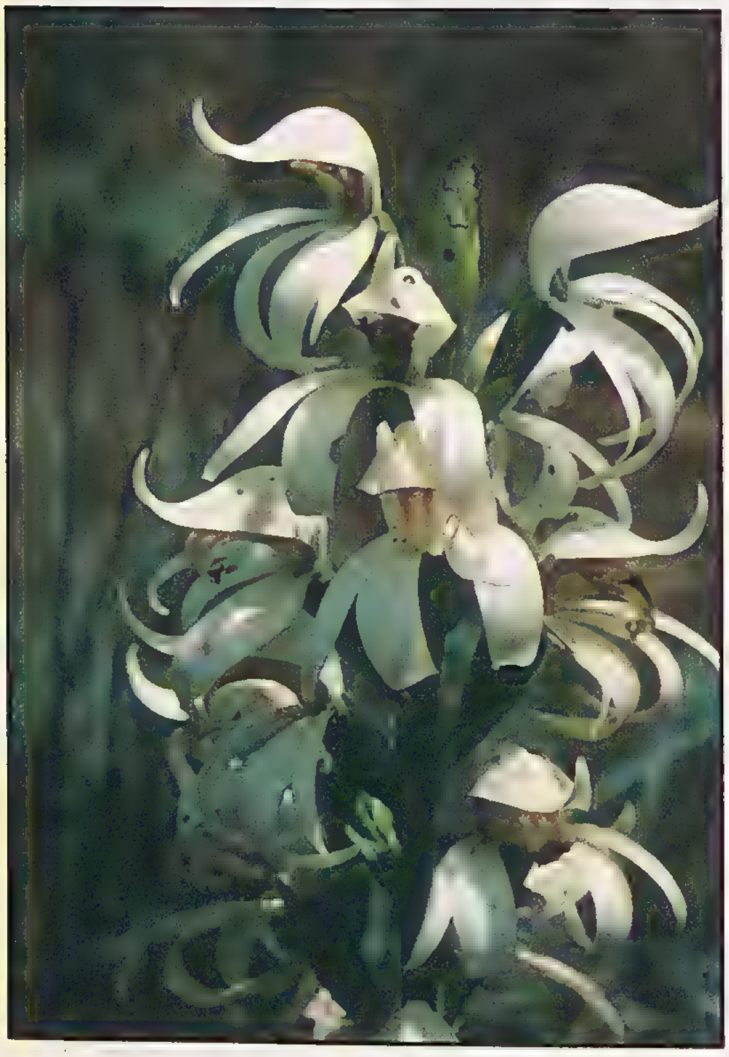
THE ISLAND NATION: VANUATU

Vanuatu, formerly the New Hebrides, is a little known group of 80 islands in the south-west Pacific Ocean. The islands lie south-east of New Guinea, north-east of Australia, and west of the Polynesian Islands of the Pacific. Their nearest neighbours are New Caledonia, 400 km away and the Solomon Islands and Fiji, both approximately 800 km away. The New Hebrides were ruled jointly by Britain and France as a condominium from 1906 until their independence in 1980 when the islands were renamed Vanuatu, which means 'Our Land'. However, despite the fact that the islands were under British and French administration, their flora is still poorly known. Research is now being done on this interesting orchid flora at the Royal Botanic Gardens Kew. A book, "The Orchid Flora of Vanuatu" by B. Lewis and P. Cribb, will be published this Autumn.

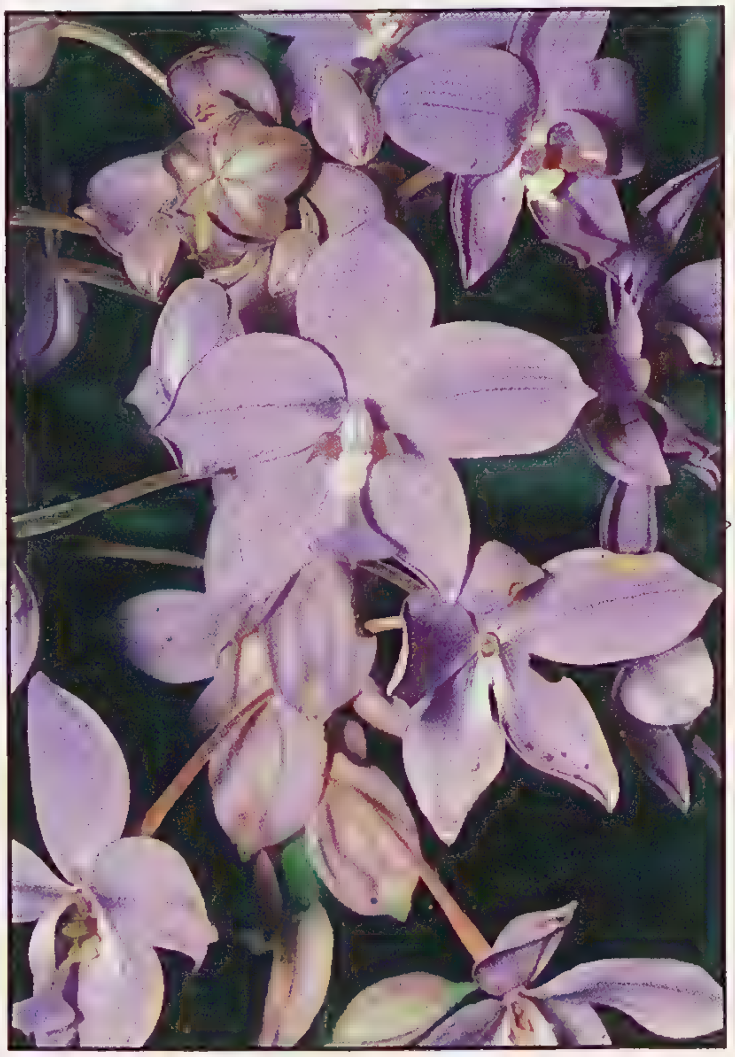
The total area of the islands is 14,763 sq. km, making Vanuatu one of the larger groups of islands in the Pacific. The main islands are, from north to south: Espiritu Santo (usually called Santo), Malekula, Ambrym, Epi, Efate, Erromanga, Tanna, and Anatom (formerly known as Aneityum). The largest island, Espiritu Santo, is 112 km long and 64 km wide. The islands are scattered over a length of about 1000 km of ocean, and run from north-west to south-east in a Y-pattern. The highest mountain, Tabwemasana, is on Espiritu Santo and rises to 1,889 m.

VEGETATION OF VANUATU

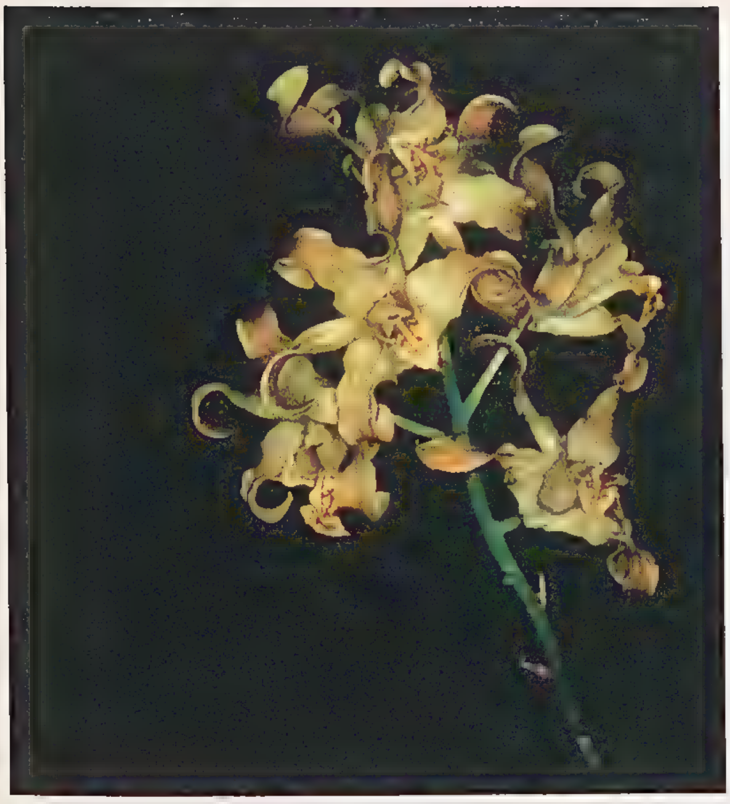
The Vanuatu archipelago extends through a range of latitudes and thus varying seasonality contributes to a recognisable difference between

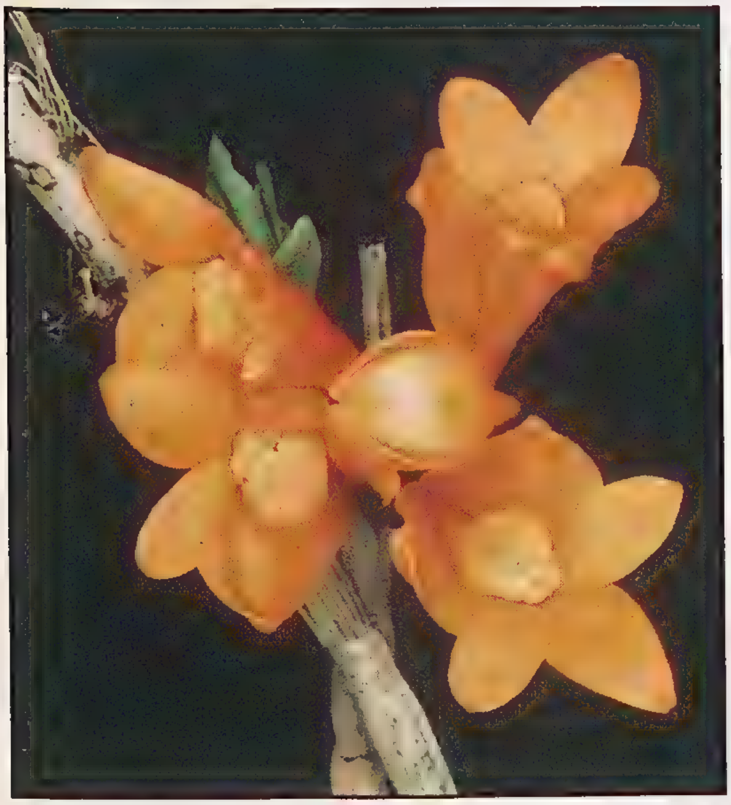


Megastylis gigas is found on New Caledonia and the southern islands of Vanuatu.



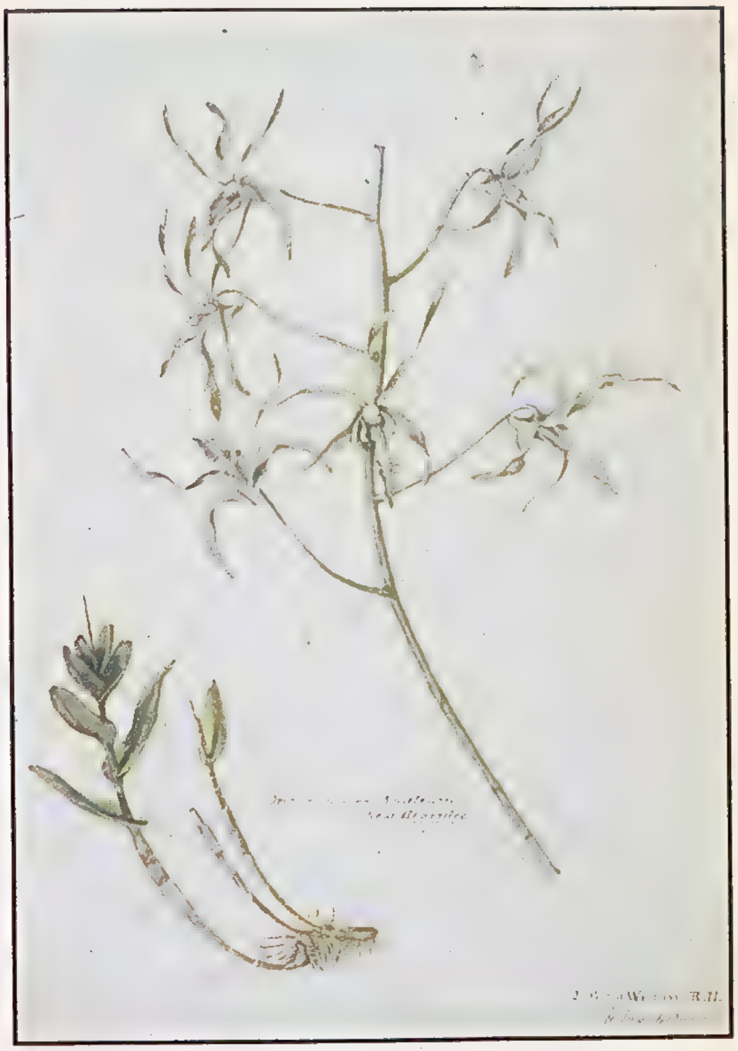
Spathoglottis plicata is a common species on Espiritu Santo.

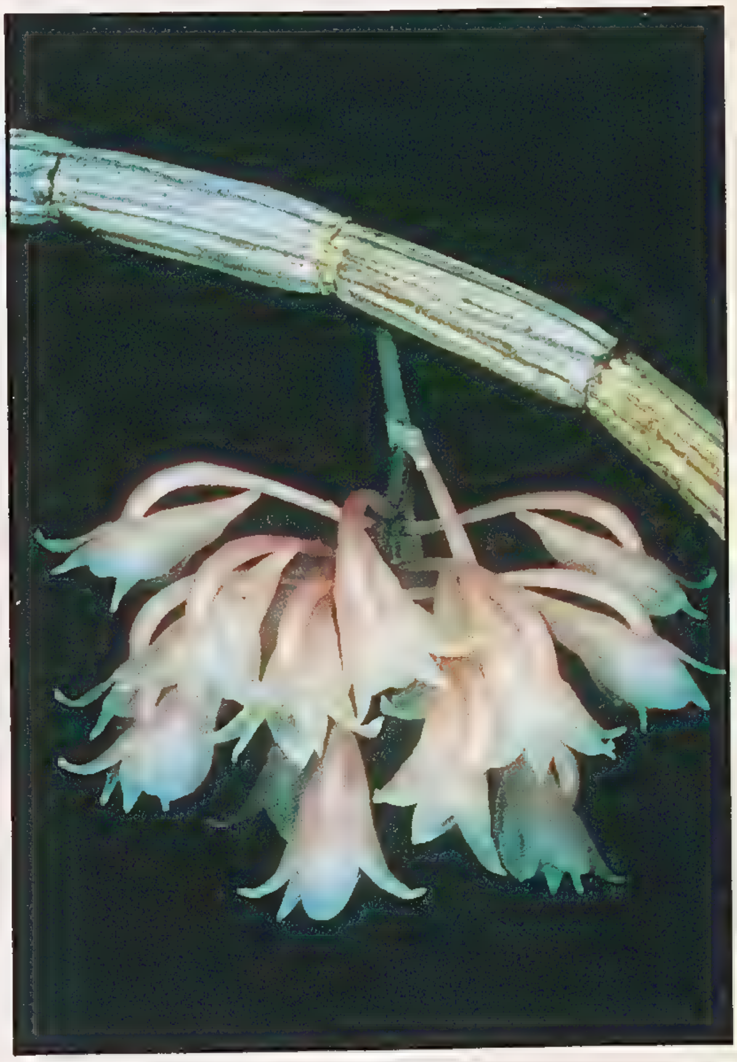




Top left: *Dendrobium conanthum*, a member of section *Spatulata*, is found on the banks of the Jordon River on Espiritu Santo.
Top right: *Dendrobium macranthum*, an antelope dendrobe from Anatomu.
Bottom right: *Dendrobium rarum* from the slopes of Mt. Tabwemasana on Espiritu Santo.
Bottom left: *Dendrobium mohlianum*, a brightly coloured epiphytic orchid of the montane forests on Mt. Tabwemasana.

All photos by P.J. Cribb





the floras of the northern and southern islands. The northern region, with a tropical climate similar to the Solomon Islands, contains the largest islands: Espiritu Santo and Malekula. The southern region of the archipelago consists of five smaller islands, and has a cooler subtropical climate, hence most European settlement has been in the more comfortable climate of these southern islands. The proximity of New Caledonia with its strange flora has had a marked effect on the flora of the southern islands. For example, *Megastylis gigas* and *Dipodium punctatum* var. *squamatum* are only found on New Caledonia and the southern islands of Vanuatu.

The vegetation of the islands is similar to that of New Guinea and the Solomon Islands, but with fewer families, genera and species represented (Chew, 1975). In fact the Torres Islands, Vanuatu's northern-most group, are only about 100 km away from the Santa Cruz Islands, the southern-most of the Solomons.

CLIMATE

Climatically, Vanuatu is affected by the south-east trade winds which prevail for most of the year. Cyclones have had a profound effect on the vegetation and many of the trees are stunted due to wind pruning. Shifting agriculture has also had an effect and much of the forest is of secondary status. Extensive areas of forest have been cleared for plantations and pastures, particularly on the plateau of Efate and Espiritu Santo. In coastal areas of other large islands, the forests have also suffered from logging of Sandalwood and Kauri Pine. However, there is still much closed forest.

EUROPEAN EXPLORATION

The first European to visit the islands was the Spanish explorer, Pedro Fernandez de Quiros in 1606. He landed on the shores of an island which he named Terra Australis del Espiritu Santo, because he mistakenly thought it was the great southern continent. The next European to visit the group was the French navigator Bougainville, in 1768. However, it was Captain Cook on his second voyage, sailing in the Resolution, who discovered and charted most of the islands in the group in 1774. Cook called the islands the New Hebrides, because he thought that they resembled the Scottish Hebrides. He entered the archipelago from the north, and sailing southward, he named most of the islands. Hence there is Cook's Bay on Erromanga and the Banks Islands in the north, which were named after Joseph Banks. George Forster, the botanist on this trip, collected the first orchids from the islands, including the saprophytic orchid *Dipodium punctatum* var. *squamatum*.

In 1859, the voyage of the Herald visited Anatom, Tanna, Futuna and Erromanga, and the naturalists W. Milne and J. MacGillivray collected plants from the islands, which are preserved at the British Museum.

ORCHID FLORA

One of the earliest accounts of the flora of Vanuatu was made by the Australian botanist Baron Ferdinand Von Mueller who listed only four orchids: *Spathoglottis pacifica, Corymborkis veratrifolia, Peristylus novoebudarum* and *Gastrodia orobanchoides* (syn. *G. cunninghamii*), based on the collections made by Rev. F.A. Campbell (Campbell 1873). A more detailed account was made by the French botanist, A. Guillaumin (1932, 1948), who listed less than forty orchids in his "Flora of the New Hebrides". This work was based on collections by D. Levat and Miss L. Chessman, a remarkable woman who travelled throughout the Pacific collecting insects and plants for the British Museum in the 1920-30's. Oakes Ames (1932, 1933) worked on collections made by S.F. Kajewski in Vanuatu during 1928 and 1929 and described many new species. More recently, the Royal Society and Percy Sladen Trust sponsored a large multi-disciplinary expedition which explored the islands between June and October 1971. Based on its results, Chew (1975) estimated that there were approximately 40 endemic species of orchid in the islands, but this is undoubtably rather high. J. Hoock (1974) produced a provisional "Orchid Flora to the New Hebrides" in 1974, listing 83 species in 34 genera. However, this is very incomplete. At present, we estimate that there are 149 species of orchid in Vanuatu in 67 genera, with 5 species endemic to the islands (Lewis, Cribb and Allkin 1988). However, this number is likely to increase as the islands become better explored. Although this is poor in comparison with places such as New Guinea, it is relatively rich when compared to the orchid flora of Europe. The island of Anatom, which is only 14.5 km long by 12 km wide, has 53 species of orchids, and a recent field trip to the island of Espiritu Santo by Phillip Cribb recorded 92 species of orchid, many of which are new generic records for the islands and some are new species. The orchid flora of the islands is very diverse, some species have large showy flowers, such as *Dendrobium conanthum* and *D. macrophyllum*, whilst some, for example species of the genera *Liparis, Malaxis* and *Phreatia*, have flowers only a few millimetres wide. There are terrestrial, epiphytic and saprophytic species on the islands. One of the most spectacular and well known of the island's orchids is *Dendrobium mohlianum*, a montane species which is widespread throughout the Pacific. This species is in section *Calyptrochilus*; 'calyptra' is a Greek word meaning hood and it refers to the apex of the lip which is hooded. This effectively closes the nectary, formed by a great enlargement of the keel, to smaller unwanted visitors which may rob the honey but not fertilise the flower. The substantial red flowers are probably pollinated by honey-loving birds.

There are 27 species of *Dendrobium* reported from the islands. After *Dendrobium*, the second largest genus in Vanuatu is *Bulbophyllum*, which is represented by 16 species. These include the attractive, widespread species *B. longiflorum*, in section *Cirrhopetalum*, which is characterised by having an umbellate inflorescence. Another striking species found in Vanuatu is *B. streptosepalum*, which has twisted lateral sepals about 6 cm long. This species is known only from Vanuatu and New Guinea.

Other common orchids on the islands are the antelope dendrobium, *D. macranthum*, which grows in strand forest, and the pink flowered *Robiquetia bertholdii*, which is found from the seashore to lower montane forest. The large terrestrial orchids *Phaius tankervilleae* and *Calanthe triplicata*, grow amongst bracken and tree ferns in open grassland. The small terrestrial jewel orchids, *Corybas mirabilis* and *C. neocaledonicus*, are found in lower montane forest. Although inconspicuous from afar, these plants are extraordinary beautiful when examined closely. Structurally, the flowers are remarkable as the dorsal sepal is large and helmet shaped, and the lip bears two spurs. The leaves are single and cordate, and have reticulate, coloured venation.

Epiphytes found on the rainforest trees include *Dendrobium mooreanum*, which is endemic to Vanuatu, the flowers being white with a greenish venation on the lip, and *D. polysema* which has hairy sepals. In the montane forest proper, the cherry orchids, *Mediocalcar alpinum* and *M. paradoxum* are found. These small, creeping plants have cherry-red flowers with green or yellow tips. The sepals are fused except at the tips. They are also bird pollinated.

The attractive genus *Spathoglottis* is represented by 4 species on Vanuatu: the commonly cultivated *S. plicata* which is widespread in the Pacific and S.E. Asia; *S. pacifica* which is found from the Solomon Islands to Tonga; *S. unguiculata* which is found from the Banks Islands to New Caledonia and Fiji; and *S. petri* which is found in New Caledonia and the southern islands of Vanuatu.

ORCHID MIGRATION

The islands are mostly volcanic in origin, and Ambrym, Lopevi and Tanna contain active volcanoes. The presence of boiling springs on the islands of Vanua Lava and Gaua in the Banks group to the north and hot springs on several other islands are further indications of volcanic activity. Mallick (1975) concludes that about 90% of the islands present area only became aerial (and thus available for colonisation) in the last 1.5 million years. Hence, Vanuatu has a young immigrant flora, and it is thought that orchids have reached the islands by long distance wind dispersal (Cribb, 1987). Situated almost in the centre of Melanesia, Vanuatu is in a strategic position lying at the crossroads of two migratory pathways, one from south-east Asia and one from New Caledonia and Australia. The archipelago therefore has an interesting intermingling of Paleo-Oriental, Australian and Pacific floristic elements.

One of the problems facing a colonising orchid is the need for a pollinating agent. Some of the most widespread species found on the islands have overcome this by being self-pollinating. For example, *Spiranthes sinensis* which occurs from the Himalayas, Pakistan to New Zealand, and *Liparis condylobulbon* which is distributed from south-east Asia to the Pacific Islands. *Calanthe triplicata* which is another widespread species from Asia to Australia, can be cleistogamous.

CONCLUSION

The orchid flora of these islands has been unjustifiably neglected until recently, and some islands in the north-east of the archipelago are only just beginning to be surveyed by botanists. There is a need to consider the taxonomy of Pacific Island orchids as a whole, as many of the island species are more widespread than previously thought. However, it is encouraging to note that the Vanuatu government is taking an active interest in their forests, and orchids have recently featured on a series of Vanuatu stamps.

ACKNOWLEDGMENTS

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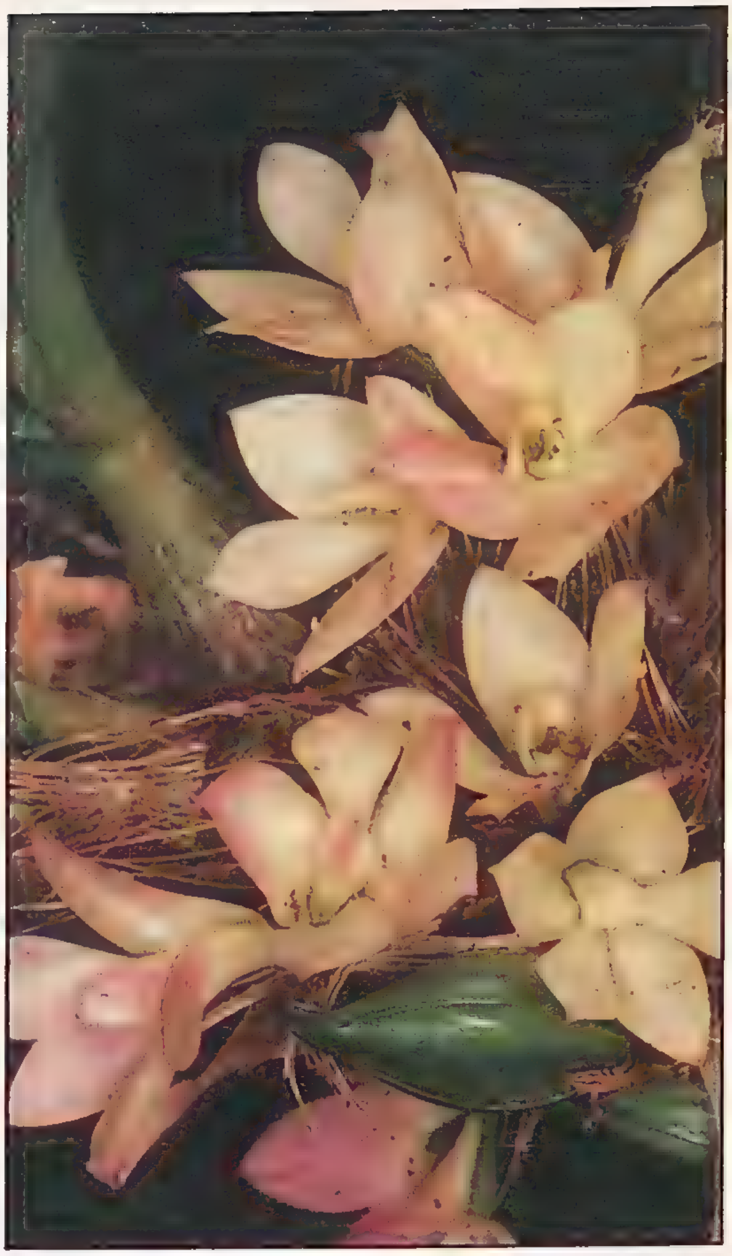

Dendrobium laevifolium is a beautiful pale pink species found on the slopes of Mt. Tabwemasana on the island of Espiritu Santo, Vanuatu.

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REFLECTIONS ON THE FIRST AUSTRALASIAN NATIVE ORCHID CONFERENCE AND SHOW

Andree Millar
2/21 Windeyer Street, Thirlmere, NSW.

[Editor's Note: Andree Millar was a member of the Organising Committee of the First Australasian Native Orchid Conference and Show. At the Conference, I heard many people express their admiration of the major part she played in the Conference from its conception to successful completion. She is still hard at work writing her own articles about the Conference, and encouraging others to make contributions of their own. Those articles will appear in future issues of *The Orchadian*. Here Andree gives an idea of what it was like from the inside looking out, and then to see it all come true.]

November 1989 to September 1990 ...... never did the days pass so slowly in the first weeks, nor rush past so quickly in the last 25 days before the momentous 26th September 1990 – the day the First Australasian Native Orchid Conference and Show opened in Wollongong. Thanks to a small group of people in Wollongong who had the courage to take the first step, who had the foresight to see what a great occasion it would be, the Australasian Native Orchid Society, know as ANOS to hundreds of native orchid lovers, is now know both Australasian-wide and International-wide. In other words, it was a success; a magnificent success orchid-wise, and a stupendous success in that we balanced the books, thanks to a wonderful treasurer and a courageous Council of ANOS, of which I am very proud to be a member.

Well, let's begin at the beginning. One day in November 1989, a dedicated native orchid lover, Ron Wheeldon, stood up at a meeting of the Wollongong and District Native Orchid Society and asked for volunteers to stand up and work for ANOS, and I remember his words ... 'to help save the native orchids and to raise funds to do so'. Two people stood up, and I am proud to say I was one (although I was to question my sanity many times over the next year). A few days later, I telephoned Ron Wheeldon and asked him what he thought about planning an International Show solely concerned with the species and hybrids of Australasia. When he recovered, he rang back to say he and Anton Van Bysterveld, then an ANOS Councillor, thought it worth discussing. So I invited them both to dinner, and five others turned up. After I had enlarged the casserole with I don't know what because I am an indifferent cook, we got down to business. We agreed on the format; solely on native orchids and their hybrids, and the theme would be conservation and the promotion of our young hybridisation industry.

I then went off to spend Christmas with my teen-age grandchildren, and left Ron with the task of convincing ANOS Council. They said that we could go ahead, so Wollongong Group did. In February, I did one of my favourite chores, talking to the Victorian Group of ANOS and the Victorian Species Society. They listened, and that is all they did for some time. But we have no complaints about their hearing. They wrote and said 'Go ahead, and here is our first cheque for $500.' Talk about manna from heaven. We looked at that letter for so long it is a wonder that the print did not fade. We had practically no money, a host of critics saying it could not be done, that we were plain crazy, and there was Dean Shannon's signature ... we practically canonised him. How his ears must have burnt.

And I guess that here is the time to say that without Victoria's encouragement we could not have done it. Without Helen Richards coming to the Annual General Meeting of ANOS and telling us what they would do, what we should do, and how much they were looking forward to it, we could not have found the energy for the last two months. We on the Organising Committee needed that wonderful dose of the fellowship between the ANOS Groups.

In the first few months, we were wondering about in the dark a bit. Three of us had been to World Orchid Conferences and had some idea of procedure: Walter Upton, Barry Collins, and myself. We formed Committees to get the ball rolling. Ron Wheeldon was elected Chairperson of the Organising Committee, and I have it on the best authority (from the horse's mouth actually) that he aged rapidly between November 1989 and September 1990. However, he is shedding the years now, and, I should hope, is extremely proud of the good job he did, the incredibly long hours he put in, the endless kilometres he drove from one ANOS group to the next, and I would hate to add up his telephone bill.

One by one, the ANOS groups around the country came in with physical and verbal support. We were inspired by two new groups forming during the year – ANOS Mackay and District Group, and ANOS Macarthur and District Group, and the revival of the ANOS Townsville Group which sent members to the show. Darwin now includes native species and Australasian hybrids in their show, and Geoff Harrison of Mossman is on the move (but more about Geoff's initiatives later).

Before I go on to describe our successes, let me outline the obstacles we had to overcome, so that the next Committee avoids them. The first thing to do is choose your venue, where to hold the Conference and Show. In this, we made a costly mistake, in both the date and in financial terms. In Committee, we voted for the Wollongong University by a large majority vote, I think out of local pride. We choose the Sports Stadium for the show and the Pentagon Building for the conference. The latter was an ideal place with great cooperation from the technicians in the organisation. We asked for the 16th September, two days after the 13th World Orchid Conference in Auckland, but we were told we could not have the facilities until the 25th when the students would be on holidays. However, what we were not told was that scores of students would not be away, and that they would be using the swimming pool on one side of the Sports Stadium, and the squash court below us, both entered through the foyer leading into the Stadium where the show would be set up. Consequently, we were enmeshed with hordes of healthy young people, wet bathing suits and Coke bottles, as they dashed back and forth to their chosen sport, VERY difficult for our patrons, especially those carrying plants. We did not realise these conditions until a few weeks before the show, and although we appealed to the Vice-Chancellor, there was nothing he could do; the Sports Stadium is completely managed by students.

We were a little disappointed with the performance of Uniadvice, the organisation we contracted to manage the show. They are also separate from the academic side of the University and use the University facilities to run conferences. The arrangement was that they would do all the clerical work, take registrations, organise our printing, and send out schedules (at our expense). This sounded fine, but four months after registration forms went out, the complaints began pouring in. Nobody had received a receipt. When we inquired about the delay, we were told they had two other conferences on at the time, and would send our receipts out later. However, after some terse words, our receipts went out next day. The unfortunate point was that some of the registrants were overseas people who did not understand local customs, and we did loose a number of these registrants as word got around, including a large delegation from the Swiss Orchid Society. Local registrants ire was very vocal, but we did manage to get most of them back as enthusiasm for the success of the conference and show spread.

Most of our overseas delegates came from the United States, thanks to my old friend Leona Bee of the Tours and Travel Agency of the American Orchid Society. The bait was a 10-day tour to Papua New Guinea, one before the World Orchid Conference in Auckland, and another one after it, the latter coming straight down to Wollongong. They were a marvellous lot, and we did not have it exactly first class all the way around PNG. Planes were cancelled or diverted, or landed on the wrong strip which was just long enough (The pilot landed by car-lights from one of the two vehicles on the station, and impressed the Yanks very much when they clustered around to thank him by saying, 'Oh, the plane has been here before. It knew where to put the wheels down').

We had some great VIP's in attendance: Hermon Slade, Patron of ANOS, co-founder (with Gerald McCraith) of the Australian Orchid Foundation, encourager and inspiration to all orchid lovers; Dr Alec Pridgeon, Director of Education and Research of the American Orchid Society and currently trying to get some sense in CITES; Raymond McCullough, Past-President (1976-78) and Honorary Vice-President of the American Orchid Society and member of the World Nomenclature Committee; Dr Howard Wood who is continuing the uncompleted work of Professor Schelpe on the dendrobiums of the world; Dr Mark Chase from the University of North Carolina where he works on phylogeny, as also do Drs Tom Yagawa and Yugi Dogane from Japan. Dr Charles Oertle, President of the European Orchid Committee, came from Switzerland; Ronald James came from Zimbabwe where he is working to establish an organisation like ANOS; the delightful Leuenbergers, crazy to get cold-growing orchids, came from Canada; Dr Jim and Eloise Harper, searching the world for bulbophyllums, came from Ohio, USA.

From Australasia we had Dr Noel Grundon, Editor of *The Orchadian*, down from Toowoomba in Queensland; Dr Brian Molloy from New Zealand, along with several other Kiwis; the Rev. Norman Cruttwell from his beloved Mt Gahavisuka Provincial Park in PNG; and our special guests, Peter Piaowen, Frank Ginate, and Gopsy Gozapao from PNG. Dr Kingsley Dixon came from Western Australia and Mark Clements bravely came from Canberra.

The conference was fabulous. It was opened by our guest of honour, Dr Peter Bridgewater, Director of the Australian National Parks and Wildlife, Canberra. One of his staff, Dr Jane Mowatt, was brave enough to speak on CITES, and fielded a barrage of questions with the most graceful aplomb. Our four chairmen, Murray Corrigan, Barry Collins, Ron Kerr, and Bill Smoothey did a great job in spite of the fact that everybody went over their time, but nobody minded.

For me, the success of the Conference and Conservation Seminar has been the peak of my career ... getting those damned papers in was the hardest job I have ever had. Four speakers got their papers in by the due date, end of May 1990; most of the remainder got their papers in by the end of August, by which time I had run out of polite letters asking them to hurry up, and had resorted to good Australian. The best excuse of the lot came from Phillip Cribb who apologised and said he had been away in China walking through fields of paphiopedilums; I guess you can not beat that.

The Conference Hall was packed each day. We had research papers based on original work of the authors; none of them stuffy but conveying the message to the listeners in the way they could appreciate the meticulous work of scientists. There were papers on our species and how to grow them. But I think our shining achievement was the Conservation Day Seminar. I believe that we were the first International Conference to devote one full day to the question of conservation of orchid species. Perhaps the lesson we learned from the Conservation Day was that Australia is a big country, and, in the past, we have concentrated on south-eastern NSW and Victoria. It was comforting to hear of the conservation efforts being made by the new groups in Mackay and Townsville, and of the umbrella organisation proposed for isolated ANOS groups by Geoff Harrison, now resident in Mossman, North Queensland.

I believe the part that got to all our ANOS hearts was the good fellowship, the instantaneous friendship among delegates from all groups, the feeling of belonging, of continuity in our work, the glow of pride as we looked around that glorious display of colour and beauty of the magnificent specimen plants, the exquisite hybrids, the unbelievable beauty of Les Nesbitt's terrestrials, and the exciting achievements of the new Australasian hybrids. And finally, our banquet; it was superb, and will be remembered for the food fit for the delightfully enterprising people we are, the bonhomie, the laughter, the Oscar-winning performance from our President Wal Upton who displayed unsuspected talents as an auctioneer, the humour and quite charm of our Patron's speech.

I can not end any better than to quote the words of the Conference Chairman, Ron Wheeldon, "To the small, select group of men and women who were responsible, and who sacrificed so much of their time, effort, and money, I have just one word to sum up ... MAGNIFICENT."

SHORT NOTE: *Prasophyllum nudiscapum*

On the 9.5.90, on Mt York Road, Mt Victoria, I found a specimen which keyed out to *Prasophyllum ansatum* Fitzg., previously only recorded from between Bell and Mt Wilson. It should be noted that Clements (1989) relegates this species to synonymy with *P. albiglans* Rupp, *P. densum* Fitzg., *P. densiflorum* Nubling, and *P. longisepalum* Fitzg. under the name of *P. nudiscapum* J.D. Hook. Despite collections being made of the various synonyms listed above in such locations as Waterfall, Lane Cove, Asquith, Bell, Mt Wilson and Mt Irvine, and also Hobart (Tas.), this is a new record for the Blue Mountains south of the Grose River.

Wet specimen (PRL 90003) held by myself, Faculty of Horticulture, UWS-Hawkesbury, Richmond, NSW.

Clements, M.A. 1989. Catalogue of Australian Orchidaceae. *Australian Orchid Research* 1: 1-160.

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THOUGHTS AND OBSERVATIONS ON CAULINE-LEAFED *PTEROSTYLIS*

Peter Eygelshoven
76 Taiyul Road, North Narrabeen, NSW 2101.

The factors which control initiation of flowering in cauline-leafed *Pterostylis* have been the subject of many discussions I have had with other growers over several years. Cauline-leafed *Pterostylis* are greenhoods, many of which flower in the autumn months. However, instead of producing a rosette from the centre of which the flowering stem arises, they produce a flowering stem that has narrow leaves which are usually spaced evenly from the ground to the base of the flower. Tuberoids that are not going to flower this season will form a rosette. Various reasons have been proposed by many people on what initiates flowering in cauline-leafed *Pterostylis*. In my own experience, I have found that the following factors are important in growing healthy plants, but any one of them may not necessarily be the factor that induces flowering.

Water

Beginning watering early in the season, around early December to January, may help with the summer flowering species. However, I have began to water some pots much later in the season and still had them flower well. Perhaps it is the regular watering from the beginning which helps. Problems with fungi and mites may develop during humid autumn and summer months if you begin watering too early. Autumn is also the time when moths lay their eggs on young plants, and later the grubs feast on leaves and flowers.

Light

Light could be a factor that promotes flowering. In the bush, there seems to be a higher percentage of flowering plants in areas which receive good, even light all day than in areas which are heavily shaded in the morning and afternoon, and receive full sun only during the middle of the day. In the bushhouse where light is more evenly spread throughout the day, I find that plants flower better. The amount of light is important, even though I have flowered *Pterostylis obtusa* in near darkness and *P. grandiflora* in bright light, which is the opposite light intensity each of these species experience in the bush.

Water and light intensity probably have the major influence on flowering. A constant and even supply of light and water is important. Irregular watering habits, such as to water twice in one week, followed by no water for another two weeks, and then to water two or three times in the next week, will do more damage than good. Light in most bushhouses is even, a 25% to 50% shade cloth being ideal. I have clear fibreglass over the cloth as protection against the heavy rains in Sydney during the summer and autumn months.

As well as light and water, there are some other factors which could influence flowering.

Tuberoid Size

Small tuberoids will be reluctant to flower; it is only when tuberoids reach the size of a pea that they flower regularly. However, large tuberoids will not always flower. If rosettes form, it is a sign of unsuitable conditions during the present or previous season. When plants form rosettes, I find that they produce daughter tuberoids more readily than if they flower. This was particularly noticeable with *P. fischii* and *P. revoluta*.

Potting Mix

A good potting mix should maintain an adequate supply of water and nutrients. The mix should be able to breath, as is the phrase in the trade. This means the mix is light, friable, not too heavy or close. I use a mix made from 25% coarse river sand and 75% good quality potting mix. This is the expensive bag of potting mix bought at the nursery with a reputable name on it. The mix needs to be watered twice a week in autumn and spring, and once a week in winter. The watering frequency may vary depending on your own conditions.

Fertilising

I add blood and bone to the mix when planting out the tuberoids. There are probably some fertilisers in the potting mix that you buy, so I do not like to add too much to start with. This year for the first time I will add some soluble fertiliser to the plants, but only at half strength.

Temperature

Temperature only affects the high altitude species like *P. coccinea* or *P. abrupta*. With these species, I find that watering during the summer months helps to keep the tuberoids cool, ensuring that a relatively good flowering takes place, around 50% with *P. coccinea*. Many growers put tuberoids under the house or even in the crisper drawer of their refrigerator. Temperature does not seem to be very important for most of the cauline-leafed species unless the summer is extremely hot and dry.

Summary

Care and attention to the above factors will provide good results. There is one item that we all must give great thought to when acquiring tuberoids, and this is to make sure that the clone you obtain flowers easily. I have in my collection, some clones that just will not flower readily even when all conditions seem favourable. I have other clones of the same species that flower readily no matter where I put them or how I grow them.

The above observations have been made on flowering of cauline-leafed *Pterostylis* in my bushhouse; they were not obtained from controlled experiments or tests. No doubt I will change my ideas in years to come as I try new and different cultural methods to get the best flowering I can. I should be interested to hear comments and criticism of my ideas. After all, it is through sharing of ideas that we acquire information and knowledge. And what better way to spread the news than through the pages of *The Orchadian*.

BULBOPHYLLUM DIGOELENSE J.J. Smith

N.H.S. Howcroft.
Forest Research Institute, P O Box 314, Lae, PNG.

INTRODUCTION

The orchid, briefly described and illustrated in this article, belongs to a distinctive section of *Bulbophyllum* called *Dialeipanthe* Schltr. This section can be distinguished from other sections within the genus by the slender, long inflorescence (up to 30 cm or more), and the single flowers which are produced in succession. The flowers arise from persistent, laterally flattened, alternating bracts. The arrangement of the bracts is similar to that on the rachis of species of *Thrixspermum* Lour. The flowers are often fairly large with narrow sepals and a mobile lip that is fairly long and fleshy. The plants are usually of medium size with well developed pseudobulbs.

DESCRIPTION

Bulbophyllum digoelense J.J. Smith in *Bull. Dep. Agric. Neerl.* XLV (1911) 10; in *Nov. Guin.* VIII (1911) 593-4, table CV a and b; Schlechter, in *Fedde Rep. Beih.* 1:758 (1912) et in *Fedde Rep. Beih.* 21: fig. 955.

Plants epiphytic, rhizomes slender, creeping. **Pseudobulbs** close, conical, often curved, longitudinally wrinkled when old, to about 3 cm long and 1 cm wide at base. **Leaf** narrowly obovate-lanceolate, apically acute, up to 22 cm long and 1.6 to 2.8 cm wide (Fig. 1A). **Inflorescence** ascending from base of pseudobulb; peduncle 34.3 cm long and 0.1 cm in diameter, dark green and brown, glabrous, with 5 tubular sheaths; rachis elongating, with a succession of laterally compressed bracts slightly overlapping and alternating; bracts acute, acuminate, about 0.7 cm long. **Flowers** widely expanded (Fig. 1A). **Dorsal sepal** narrowly lanceolate, acuminate, concave, yellowish white with 8 purplish nerves, glabrous, around 3 cm long and 0.8 cm wide (Fig. 1B). **Lateral sepals** obliquely lanceolate-triangular, acuminate, concave, yellowish white with raised purplish nerves, around 3.6 cm long and 1.1 cm wide at base (Fig. 1C). **Petals** small, quadrangular, apex 3-dentate, laterals triangular, intermediate elongated and narrowing towards the apex to form a filament, with longitudinal purple striations, pink lateral patches and pale green and white at base, around 0.9 cm long and 0.26 cm wide (Figs. 1F and G). **Labellum** large, fleshy, mobile, 3 lobed (Figs. 1E and D), 2.25 - 2.7 cm long, 0.6 - 0.67 cm wide between the lateral lobes, dark purple to maroon with some yellowish green; base somewhat concave and yellowish green; with parallel ridges extending from the lateral lobes forming a yellow-green dorsal depression, margins irregularly crenulate, surface verrucose

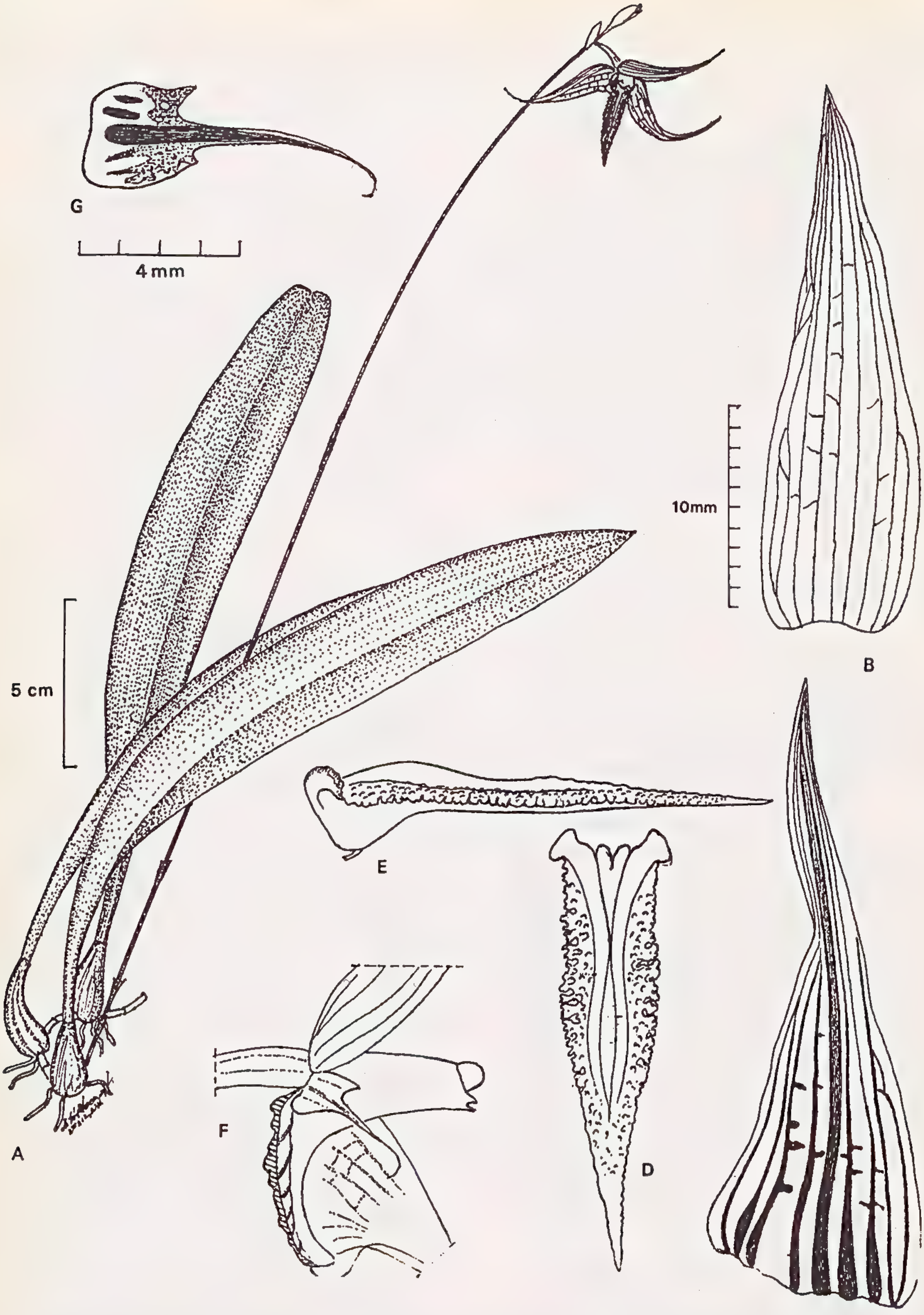

Figure 1. *Bulbophyllum digoelense* J.J. Smith. A: Whole plant. B: Dorsal sepal. C: Lateral sepal. D: Labellum from top. E: Labellum from side. F: Side view of flower showing petals, column, and base of sepals. G: Petal.

to papillose on the upper two-thirds, the apical portion becoming rugulose; lateral lobes erect, curved, falcate, triangular, apically slightly bidentate. **Column** around 0.75 cm long and 0.4 cm wide, stelidia short and bidentate (Fig. 1F). **Anther** hood-shaped, obtuse, white with some purple. **Pollinia** 4, oval-triangular. **Stigma** large.

NOTES

Distribution

The recorded distribution areas are indicated on the distribution map in Figure 2. For Irian Jaya, we have the Branderhorst collection, no. 23b, from Digul, and the Gjellerup collection, no. 400, from the Djayapura area. In Papua New Guinea, the two collection sites are near Lae and Schlechter's collections nos. 17389 and 19259 from the Waria region. Specimens collected on the Papua side of the island have been sighted by the author. These come from the western province and the central provinces from coastal forest regions, but details of the exact locations were not available to include here.

The section is distributed from Malaysia to New Guinea, Fiji and Samoa. So far around 23 species and 2 varieties have been described for the section over this range. The New Guinea species are as follows: *B. acuminatum*, Schltr.; *B. caloglossum* Schltr.; *B. crocodilus* J.J. Smith; *B. digoelense* J.J. Smith var. *septemtrionale* J.J. Smith; *B. distichum* Schltr.; *B. dubium* J.J. Smith, *B. elasmatopus* Schltr., *B. hamadryas* Schltr. var. *orientale* Schltr.; *B. mamberamense* J.J. Smith; *B. papilio* J.J. Smith; *B. pictum* Schltr.; *B. pristis* J.J. Smith; *B. rigidipes* Schltr.; *B. scrobiculilabre* J.J. Smith; *B. serra* Schltr.; *B. spathilingue* J.J. Smith;

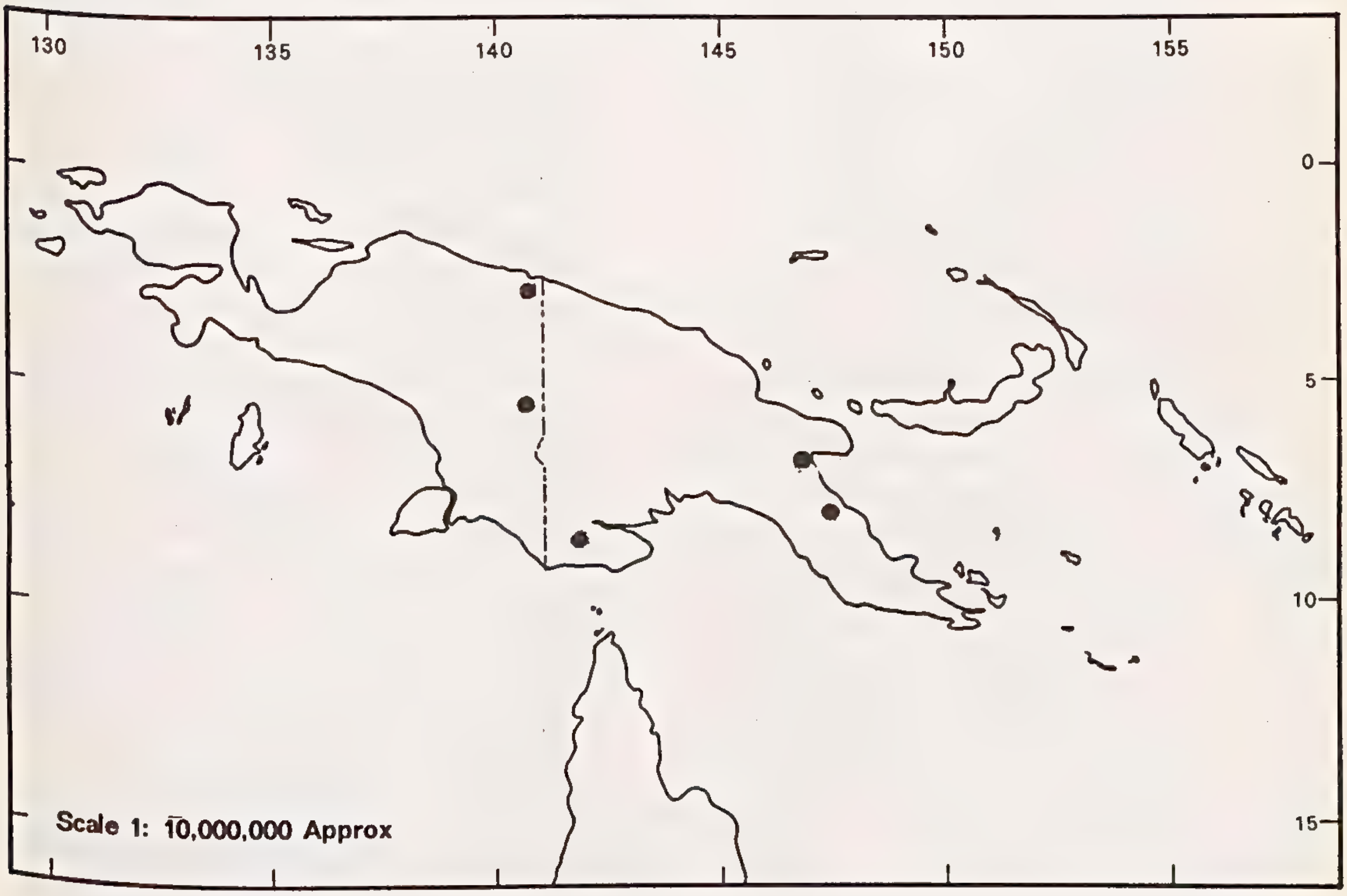

Figure 2. Locations where *Bulbophyllum digoelense* J.J. Smith has been collected in Irian Jaya and Papua New Guinea.

B. teretilabre J.J. Smith; *B. thrixspermiflorum* J.J. Smith; *B. thrixspermoides* J.J. Smith (Smith 1911, 1916; Schlechter 1913, 1982).

The Malayan species are *B. cleistogamum* Ridley, *B. lumbriciforme* J.J. Smith and *B. stella* (Holttum 1964); the Fijian and Samoan species are *B. longicapum* Rolfe and *B. praealtum* Kraenzl.

Habitat

The species grows as an epiphyte in both open and dense shade in rainforest, gallery forest and in evergreen monsoon forests. The altitudinal habitat is from sea level to about 400 m.

Cultivation

Plants can be grown with reasonable ease on hard wood slabs, cork, in baskets or pots. In the latter, good drainage is essential. The author's specimen is grown in dense shade on *Calliandra*. This specimen appears to be quite at home in this situation. The inflorescence is sensitive to insecticide applications and care needs to be exercised when spraying flowering plants.

Flowering

From field collection records the known flowering periods are as follows: Gjellerup no. 400 in December; Schlechter nos. 17389 and 19259 in March and April. The author's specimen produced single flowers from July to September. A Port Moresby specimen in cultivation was observed flowering in September.

Pollination

Very little is known about the pollinators of the majority of New Guinea orchids, lack of time and opportunity are usually the constraints in this field of research. It was therefore of great interest to the author to observe that a large blowfly had become firmly stuck in the stigmatic cavity of the first flower produced by the author's plant within a few hours of the flower opening early in the morning. The anther cap had been shifted from its original position and the pollinia removed. No scent from the flower was noted at the time. However, scent from specimens of the genus have been noted to come spasmodically from the flowers during the day. It is also possible that some scents may be too weak for human detection.

Taxonomic

The section *Dialeipanthe* was formerly known as the section *Intervallata* Ridley. When *B. digoelense* was described by Smith the species was placed by him in this section. Schlechter (1913, 1982) changed the name from an adjectival one to a substantive one. This was consequently accepted by Smith.

For those who have a copy of Millar's book *Orchids of Papua New Guinea* (Millar, 1978), it should be noted that the *Thrixspermum arachnites*, illustrated on page 70, is not that species, but a *Bulbophyllum* of the section *Dialeipanthe*; in this case the lateral shape suggests that the species is *B. distichum*.

Conservation Requirements

Nothing is on record as to whether or not this species or its relatives are under threat from over collecting or through habitat destruction. The author's specimen came from an area that has been selectively logged some six times, some of that same area has been clear felled for subsistence gardening. Orchids, and particularly this species, are by no means considered very common in the collection area. Although further up into the mountains this species becomes more apparent among the epiphytes on the lower trunks of the trees, it still does not appear to be all that common. Possibly this species needs to be given some protection over parts of its natural range but this can only be determined if more is known about its distribution and local abundance.

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C.K. Ingram.
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George Caley, one of our earliest botanical collectors, is commemorated in the orchid genera *Caleana* and *Paracaleana* (Editor's note: M. Clements of Canberra Botanic Gardens, considers that the characters used to separate *Caleana* and *Paracaleana* are not sufficiently significant to maintain *Paracaleana* as a separate genus.), and also in the following species: *Dodonaea caleyana* Don (*D. boroniifolia* Don); *Viola caleyana* Don; *Acacia caleyi* Cunn. (*A. podalyriifolia* Cunn.); *Anadenia caleyi* R. Br. (*Grevillea ramosissima* Meisn.); *Banksia caleyi* R. Br.; *Grevillea caleyi* R. Br.; *Persoonia caleyi* F. Muell. (*P. chamaepeuce* Lhotsky); *Prostanthera caleyi* Benth.; and *Eucalyptus caleyi* Maiden

Although George Caley was, by training, a botanical collector only, his indefatigable nature, intelligence, love of learning and desire for success, enabled him to lift himself out of the lowly class to which he was born, and to mix with knights, governors and some of the greatest scientists of the age. This was one of his greatest achievements in a period of rigid social castes.

Contemporaries commented on his irritability, his secretiveness and his acquisitiveness, but even they recognised that those were the only weapons he had with which to secure and retain the position in society he regarded as rightfully his. History contains a number of examples where lowly folk, by sheer ability, single-mindedness, devotion to duty and persistence have risen above their ordained station: Caley is one of these.

Although, primarily, his field of expertise was botany, like many of his contemporaries his interests in natural history were wide. It is apparent that his Australian bird collections, for instance, were the most comprehensive made up to the time he left the colony in 1810. Then, again, Caley was not unaware of what was happening in the turbulent colonial politics of his day. His "Reflections on the Colony", particularly of the Rum Rebellion, although he was not called as a witness at the subsequent trial in London, have been regarded by some historians as the best objective report there is.

As to the significance of his epic journeys of exploration, especially that to Mt Banks (November 1804), Mrs Joan Webb's recent researches (pers. comm., 29.5.1989) indicate that they have had much greater influence on his contemporaries than historians to date have believed. In the first instance, Caley travelled to England on the same ship (May, 1810) as William Lawson, who, "on his return, was one of the party who first entered the interior by this tract". (Letter from Caley to William Merry Esq., 8.4.1822). Secondly, the Blaxland party of 1813 took with them a bushman, James Burns, who had gone with Caley into the "forbidding maze of mountains and gorges" (Bill Peach, "The Explorers", p.14) known as the Devil's Wilderness, in his vain attempt to pick the right ridges across the mountains. Obviously, the 1813 party wished to gain maximum benefit from Caley's party's experience.

Caley contributed considerably to his own lowly status as a botanical collector. His only excuse can be that, out of loyalty to his patron, Banks, and to those dealers in England with whom he had Banks' permission to trade, he kept details of his botanical discoveries from his superiors, such as Lieut. Grant and Gov. King. ("How far he has been successful in collecting I do not know, as he keeps his counsel to himself"; and again, "I find him secretive and irritating".) Even Banks, his employer, found him "a wild man".

In fact, I find much contemporary generosity towards Caley, in recognition of his services to science, despite the disservice he does himself. He enjoyed the close friendship of George Suttor (his social equal). He was held in high regard by his commanding officer, Lieut. Grant. Allan Cunningham, an outstanding botanist, called him "accurate, intelligent and diligent". The Father of Australian Botany, Robert Brown, wrote him "Botanicus peritus and accuratus". Francois Peron termed him "enlightened, indefatigable and modest". And even the long-suffering Gov. King wrote: "With all his faults ... I believe him clever and faithful."

Thus, when Caley claimed to have "done more towards increasing the knowledge of the natural history, geography, etc., of the colony than any other man", his statement, as J.E.B. Currey emphasised, if true, was so for a short time only - his achievements being supplanted by those of Brown, Gould, Blaxland, etc. It is regrettable that the one man, William Lawson ("Old Ironbark"), who could have given us a sound assessment of Caley's significance to 'Geography' "was essentially the strong, silent type - a practical hardbitten man" who, apparently, left no record of what he learned from Caley and Burns.

If Caley ever entertained seriously his original intent to compile "A Flora or Natural History of the Colony", he must have quickly abandoned it when Brown appeared on the scene. It was Brown, not Caley, who did the first major work on the Australian flora. In three years (1802-5), Brown and his team collected what Currey has rightly termed "The staggering number of 3,900 new species", and laid the basis for producing his monumental "Prodromus", described by Hooker as "the greatest botanical work that has ever appeared" to that date.

But, significantly, there is also no doubt that Brown, the scientist, appreciated those specimens given to him by Caley, the collector, and which, subsequently, received mention in the "Prodromus" and in Bentham's "Flora Australiensis". I cannot accept King's assertion that Caley was really jealous of Brown. Caley recognised his own inadequacies and limitations. He was an able, diligent and accurate collector, not a scientist ("I have tried of late to use the language of Linnaeus ... but I have to lament that this is above my reach"). He realised, too, how much he would gain by associating with Brown. ("I shall be much benefitted by Mr Brown"). However, he was not oblivious to the value of the help he could give Brown, viz. his detailed knowledge of the colony, and his ability to show "the most likely places to meet with new plants".

What, now, of the significance of Caley's work to his botanical heirs and successors, seeing he obviously did not attain his own expectations, nor those of his contemporaries? For example, Brown, speaking of Caley's "numerous discoveries", including over 30 new plants from the Mt Banks' expedition alone, hoped Caley would obtain "that reputation among botanists to which he is well entitled". Rapidly, albeit undeservedly, I believe, he became only a minor explorer and botanist, and his influence, most regrettably, minimal.

Perhaps he deserves most commendation for the examples he set in (a) his devotion to natural science; ("Every inch of ground I consider as sacred, and not to be trampled over without being noticed"), and (b) his benevolence towards the aborigines, with whom he had the ability (rare in his time) to relate, and from whom he learned a great deal, particularly regarding eucalypts. Yet even in these enlightened views he exerted no marked influence on his contemporaries or successors. Perhaps as his resurrection continues, he will be given his rightful place by the conservation movement of today.

Maybe, his greatest contribution to Australian botany is that he was the first to recognise hybridisation in the genus *Eucalyptus* - which he did as early as 1810; whereas later, more eminent workers, such as Rev. Dr Woolls (1867) and the great Ferdinand von Mueller himself, believed such did not and could not happen. We now know, of course, that hybrids do occur quite commonly. One of our greatest authorities on the eucalypts, J.H. Maiden, recognised his insight: "Recently", Maiden wrote, "I have dedicated .... *Eucalyptus caleyi* to his memory, to remind botanists of his discovery of hybridisation in the genus".

Of late, there has been a revival of interest in Caley. J.E.B. Currey's (edited) "Reflections on the Colony" (1966) and Alan Andrews' magnificent "Devil's Wilderness" (1984) have stimulated interest greatly, and Caley's true worth is, at last, becoming recognised. Caley's extensive botanical collections (Blue Mts, Sydney and Parramatta, Bass Strait, Cowpastures/Nepean), for so long neglected and virtually unknown, except those given to Brown, and those unearthed by Maiden (55 sheets of eucalypts in Vienna) around the turn of the century, are now being brought to light, and undergoing critical study. For example, R.D. Hoogland (between the years 1960 and 1980) found a Caley collection of *Acrophyllum australe*, and now Mrs Joan Webb has located another, as well as significant collections of *Grevillea laurifolia*, *Persoonia acerosa*, *Eriostemon obovalis*, *Zieria murphyi*, *Z. arborescens* and *Z. cytisoides* and *Ceratopelalum apetalum*.

Because of the restricted distribution of some of these species, these discoveries are enabling botanists and historians, for example, to plot

Caley's 1804 route to Mt Banks most precisely:

(a) Kurrajong (Wildfire Ridge): *Hibiscus heterophyllus*; *Acrophyllum australe.*

(b) Tabarag/Bilpin: *Persoonia acerosa.*

(c) Bilpin/Berambing: *Xyris ustulata*; *Zieria cytisoides*; *Patersonia sericea*; *Dianella caerulea*; *Pittosporum revolutum*; *Stackhousia viminea.*

(d) Hungerford's Creek (Luminous Valley): *Acrophyllum australe*

(e) Mt Tomah: *Epacris reclinata*; *Atkinsonia ligustrina*; *Allania endlicheri*; *Adenochilus nortonii*; *Olearia quercifolia*; *Leptospermum lanigerum* var. *macrocarpum*; *Zieria murphyi*; *Z. arborescens*; *Lycopodium deuterodensum*; *Pultenaea canescens.*

(f) Mt Charles: *Adenochilus nortonii.*

(g) Mt Banks: *Comesperma ericinum*; *Thelymitra cyanea*; *Euphrasis collina*; *Grevillea laurifolia*; *Eriostemon obovalis*; *Lagenifera stipitata*; *Persoonia chamaepitys*; *Xyris ustulata.*

Caley's rehabilitation would appear to be well under way, at last. Perhaps, as a result of these recent researches, he will now obtain "that reputation among botanists to which he is well entitled".

Incidentally, Mrs Webb has laid to rest for all time the doubts long surrounding his association with the cairn of rocks known as "Caley's Repulse" near Woodford: "Governor Macquarie (sic) has fallen into a sad mistake in the place he has named Caley's Repulse ... I never was at the place ... I can assure his Excellency had I met with what he has been pleased to call Caley's Repulse, I should not have been repulsed in a hurry". (Caley's letter to William Merry Esq., 8.4.1822). It is interesting to note, too, that Caley's contemporaries, Blaxland, Lawson and Wentworth, who had Caley's companion, Burns, with them, never ascribed the cairn to Caley in their journals.

Maybe, his epitaph was best written by himself: "I have erected a line of beacons as a guide to future botanists, and rendered the road more easy to travel."

READERS' FORUM

Nomenclature of Australian Native Orchids

Dear Editor,

Each review of the *Catalogue of Australian Orchidaceae* (*The Orchadian*, June 1990)was excellent from the respective points of view. However, each adopts a long range view and I suggest that this may not be in the best interest of growers.

Like most hobbyists, I have always been suspicious of species splitting, and it was with this prejudice that I first opened the catalogue. Over the years, I have been a minor grower of Australian hybrids, and a keen observer of trends in hybridising. It soon became apparent to me that Mark Clements' upgradings matched genetic trends exerted by the new species. This can only be regarded as a factor supporting the changes.

The great difficulty is that there are now four nomenclatures to confuse those who use them most, the growers:

1. The old nomenclature which old growers follow.
2. That in David Jones' excellent *Native Orchids of Australia* which a very large number of growers possess. This varies between old and new names.
3. That in Wal Upton's *Dendrobium Orchids of Australia*, also bound to be a major reference book for a generation. This book does not fully correspond with either Jones or Clements, although it does set out to indicate genetic influences.
4. That in the *Catalogue of Australian Orchidaceae.*

The only way to avoid chaos for evermore is to follow the catalogue. Dr Eric A. Christenson in his review of the *Catalogue of Australian Orchidaceae* in the *American Orchid Society Bulletin* (June 1990) supports this view. Dr Christenson is a staff member of the Marie Selby Botanic Gardens, a world-wide recognition centre for orchid species. He states, "This work provides the basis for long term stabilisation of Australian orchid names."

Unless we educate growers to do this **now** and seek registration under new names, we will loose the opportunity to indicate genetic influences in genealogical lines in a form of great value to hybridists and seedling buyers.

Certainly the catalogue will be subject to future change, but currently it is a common starting point. The choice for ANOS is acceptance and an educational policy, or utter confusion.

Because of the subjective nature of changes in taxonomic levels, botanists wait for others to stick their necks out. Can we afford to wait for years for professional consensus?

The only sound way the catalogue can be challenged is for a professional botanist to undertake the same search of overseas herbaria and field research as Mark Clements did. Who is prepared to pay for that? Non-recognition only means a state of limbo for hobby growers, hybridists, and orchid writers.

Yours sincerely,

Ronald Kerr

260 Geoffrey Road, Chittaway Point, NSW 2259.

[Editor's Note: Please refer to the Editorial in this issue for the current Editorial Policy on use of scientific names in *The Orchadian*.]

Line Breeding of Native Orchids

Dear Editor,

It was with great interest that I read David Banks' article on line breeding (*The Orchadian* 9(10), December 1989). May I through your columns make some comment on what David had to say?

Much of the content of the article is perfectly correct and very reasonable. However I must question, most strongly, the proposition that line breeding is a plus for conservation.

I am sure that many would agree that the proliferation of orchid species from seed will reduce the pressure on these species in the wild. I will agree provided (1) that the species are proliferated as they are in the wild, and (2) that genetic diversity within a species is maintained by selfing as many clones as possible. Clearly line-breeding is undertaken solely for the purpose of breeding plants different from those in the wild. Will we end up one day with a bunch of "cabbages" similar to the cymbidiums one sees at shows?

I admire our native hybridists and line-breeders. What they have done in a short time is amazing. I wish them well, and I applaud the beautiful results of their painstaking work.

What conservation means to me is the preservation, in the wild if at all possible, of as many species as possible in as great a genetic and clonal variety as possible. When we have sufficient inviolable preserves to achieve this I will be satisfied.

So, line breeder, you may keep the results of your labour, and I shall stick to my inferior flowers of the wild clones. Please spare a thought for me and my fellow thinkers and put down seed of as many clones as possible. This can make it possible for our grandchildren to see orchid species as they really are - just like ANOS members, warts and all.

Yours sincerely,

Len Lawler

P O Box 58, Atherton, Qld 4883

Misleading Titles of Orchadian Articles

Dear Editor,

The title "Pollination of *Peristeranthus hillii* (Orchidaceae) by *Metriorrhynchus rufipennis* (Coleoptera:Lycidae)" by P.I. Forster in *The Orchadian* Vol. 9, No. 11, p. 262, March 1990, was misleading to readers. Titles should be appropriate to content. The only information provided in this brief note to support pollination by beetles, as implied in the title, was the presence of "numerous orchid pollinia attached to antennae" of the beetles. This is insufficient for the author to claim "occurrence as a pollination agent". Orchid flowers may be visited by many different insects which collect pollinia but never deposit them on a stigma and effect pollination.

The problem with misleading titles on pollination articles is that they are reprinted in reviews and reference lists of future articles, and readers will assume that criteria for pollinator status has been met. Suggested minimum criteria for pollinator status have been detailed in *The Orchadian* Vol. 9, No. 5, Sept. 1988, p. 106, and appear below:

1. Observation of the pollinator alighting on a flower which has an intact pollen cap and pollinia.
2. Pollinator enters the flower and contacts the anther.
3. Pollinia noted to be attached to the pollinator when it leaves the flower.

4. Re-entry of the pollinator into the same or another flower, with pollinia transferred from pollinator to a stigmatic surface.
5. Capture and correct identification of pollinator and orchid.

It is difficult to observe a full sequence of pollination and the literature already abounds with invalid reports. I recommend that appropriate titles for reports that only suggest pollinator status could begin – "A probable pollinator ... " or "Suggested pollinator ... ". Titles will be revised by the editors if misleading, in the interests of maintaining the excellent standards of *The Orchadian*, developed over the past two years.

Yours sincerely,

Dr P.B. Adams (Editorial Associate)
School of Botany, University of Melbourne,
PARKVILLE, VIC 3052

Collection and Export of Papua New Guinean Orchid Species

Dear Editor,

We would like to draw your readers' attention to the current situation regarding the collection and export of Papua New Guinean orchid species, thus preventing future misunderstandings and disappointment. There have been numerous recent instances of collectors visiting Papua New Guinea from abroad and attempting to export Papua New Guinean orchid species, sometimes in substantial quantities. Several of these exports have contravened the CITES regulations.

On 4th September 1990, the Papua New Guinea Government announced a total ban on the export of PNG orchid species. The Department of Environment and Conservation is now reviewing the situation with the intention of producing legislation that will allow fair and controlled export of reasonable quantities of non-endangered PNG orchids.

Papua New Guinea welcomes the many tourists who come each year to enjoy the sight of our beautiful orchids growing in the wild. But please don't expect to take them home with you.

Yours faithfully,

T.H. O'Neill

President, The Orchid Society of Papua New Guinea.
P O Box 2239, Boroko, PNG.

TWO AWARDS TO AUSTRALIAN NATIVE ORCHIDS IN NEW ZEALAND

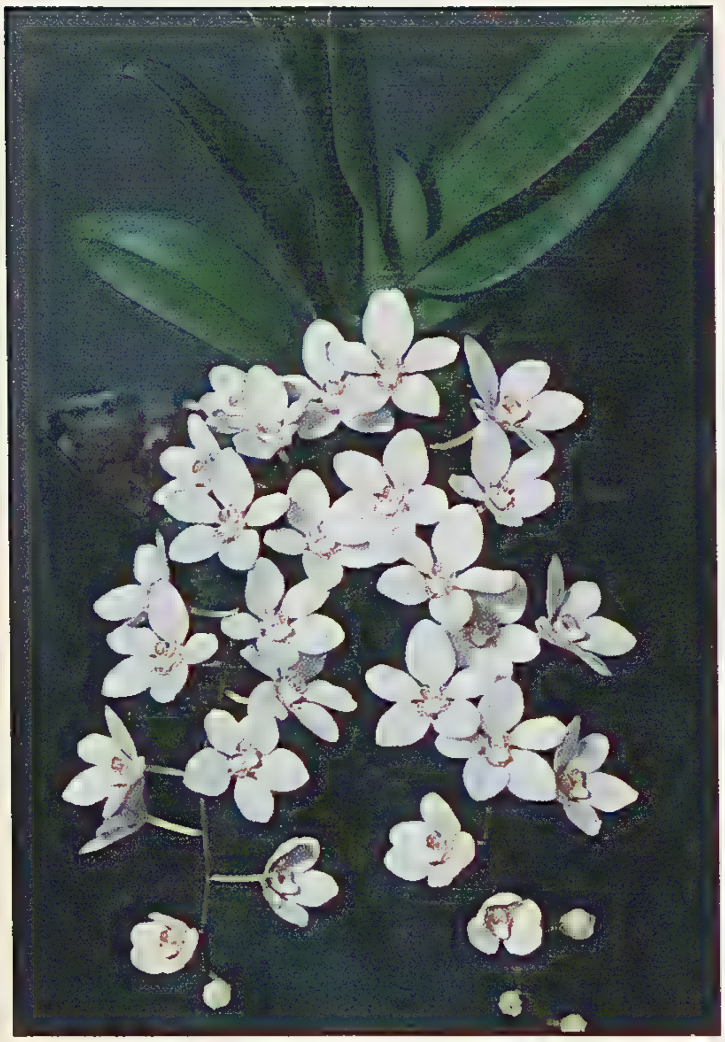
Walter T Upton
P O Box 215, West Gosford, NSW 2250.

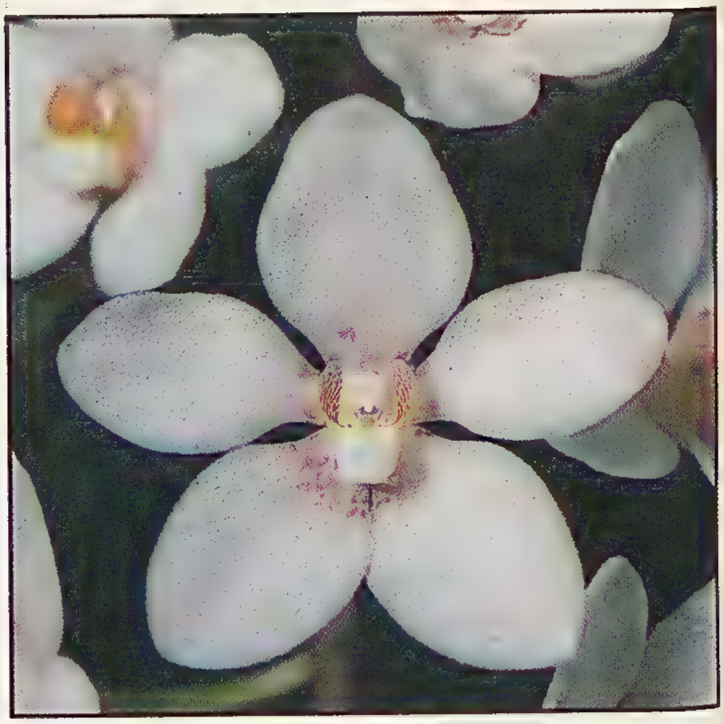
Whilst in New Zealand for the 13th World Orchid Conference, Barry Collins drew my attention to two Australian native orchids that had received awards from the New Zealand Orchid Society (Inc.). Details are as follows:

1. *Sarcochilus* Melba 'Bridal Veil' HCC/NZOS (*S. falcatus* x *S. hartmannii*); Judged at Auckland by judges of the New Zealand Orchid Society (Inc.) on 15 November 1989; Award received, Highly Commended Certificate; Owners, Rose and Neville Armstrong of 13 West Coast Road, Glen Eden, Auckland 7, New Zealand.
2. *Dendrobium* Hewitt Star 'Astra' HCC/NZOS (*D.* Allyn Star x *D.* Graham Hewitt); Judged at Auckland by Judges of the New Zealand Orchid Society (Inc.) on 5 July 1990; 14 judges present, 12 for, 2 against; Award received, Highly Commended Certificate; Owners, Rose and Neville Armstrong.
   Details: Overall width 37mm; Sepal length 31.5 mm; Sepal width 9.7 mm; Petal length 22.6 mm; Petal width 3.8 mm; Labellum length 9.5 mm; Labellum width 7.2 mm.

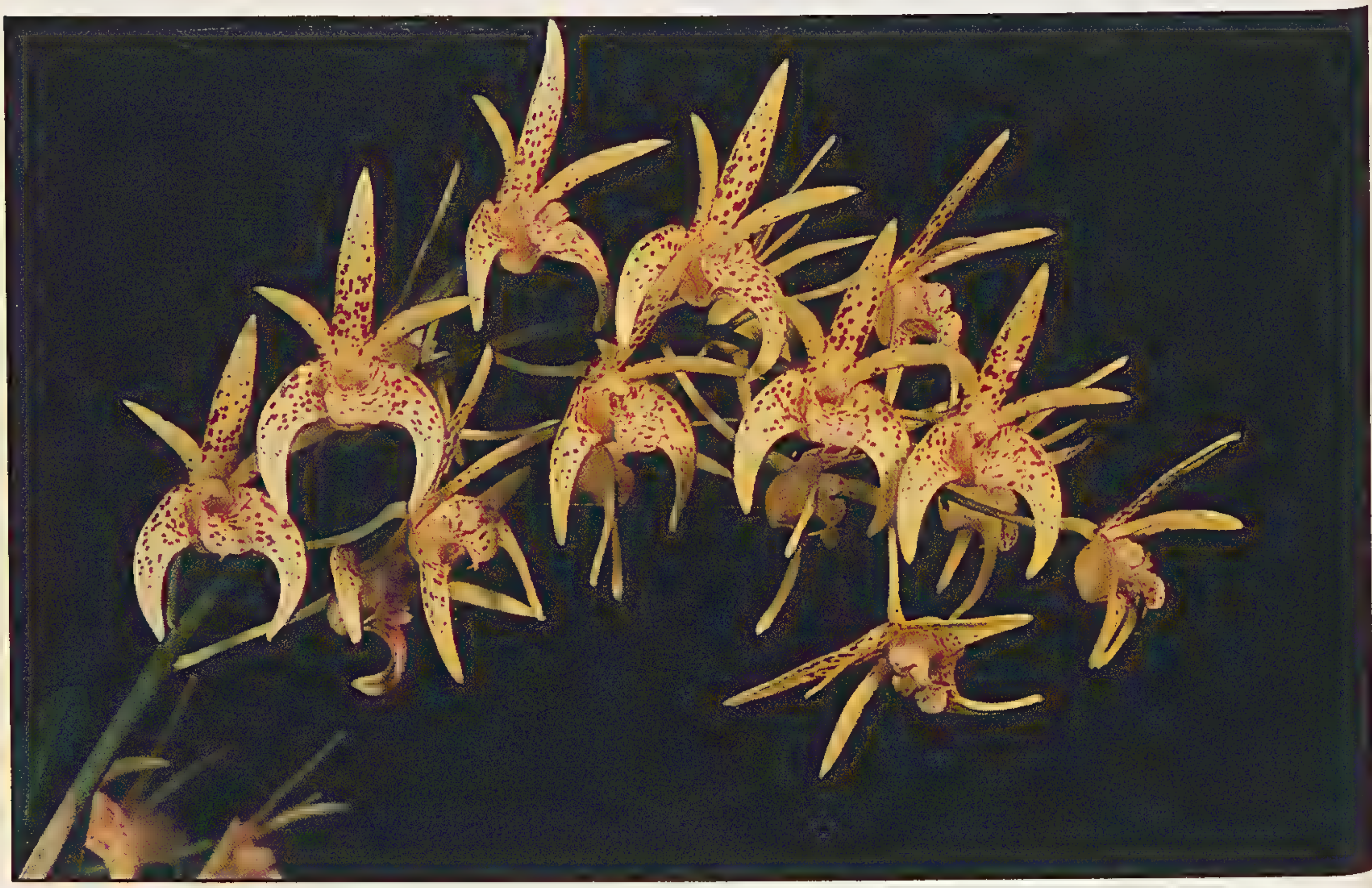
Subsequently, Rose Armstrong wrote to me giving the following details of the culture of these orchids. I quote – "*Sarcochilus* Melba is grown in a small shade house on the coldest side of our house. It has a Nova roof over the top and shade cloth all around the sides. It gets early morning sun for an hour or two, otherwise it is fairly shaded and cool; real cold if there is any wind. I use pine bark and blue metal, about five bark to one metal, with a small handful of dolomite lime. I never let the compost dry out, and feed quarter strength every watering. The *Dendrobium* is grown in the same mix but in a shade house attached to our house. It receives more light; it gets sun almost all day. In summer I put extra shade cloth on as the afternoon sun is very hot."

[Editor's note: See colour plates of awarded plants on rear cover]





Sarcochilus Melba 'Bridal Veil' HCC/NZOS



Dendrobium Hewitt Star 'Astra' HCC/NZOS

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The Orchadian

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EDITORIAL

Use commonsense to grow orchids well

We are often asked to try new products that "will make our orchids grow better than ever". Many of these are marketed by reputable firms, and must pass a rigorous testing schedule before they can be registered for release to you, the end-user. However, we are also subjected to new ideas or methods which have more in common with the 'myth and mystery' of pseudo-science.

The outlandish claims made for some of the 'myth and mystery' methods should be examined with great care. If they work, the reasons for their benefits may be completely unrelated to those given by their supporters.

I have just finished reading an article about the Bio-Dynamic way to grow orchids. Therein I found that orchids grow well when "leaf formation is produced by the moon", and "the leaf is brought to maturity by the sun which produces essential oils" which are "passed into the flower" and "given up to the atmosphere as perfume". It seems that all this happens only when we get the moon and sun cycle right by shading the plants when young, and creating a humid, forest-type atmosphere with plenty of air movement.

Please do not scoff! There is some commonsense in that statement, but also some nonsense in the reasons given for the better growth. It is sensible to create a suitable environment with the correct amounts of light, shade, air movement, and good humidity – just like you find in a forest where the orchids grow naturally. In fact, it is all commonsense!

But it is nonsense to believe that the moon has anything to do with leaf growth. Certainly, the energy of the sun is needed to form sugars and other products used when the growths are mature to produce the flowers. And some of these products are volatile oils which we call perfumes. The plant uses them to repel attacks by insects and fungi, and to attract pollinators. Again, an environment which promotes the production of these natural insecticides, fungicides, and pollinator attractants is commonsense!

Another thing that we must do with our bio-cultivated orchids is to remove the flowers before they die on the plant. The reason given is that "these essential oils will pass back into the plant ... in a state not suitable for leaf development", thereby causing "leaf eruptions, mildew, and other fungal disorders." Here we go completely from commonsense to the 'myth and mystery' of pseudo-science.

Dying flowers are an ideal site for fungal attack. Diseased flowers or leaves are a source of spores for further infection during the months that follow. It is commonsense to remove dying flowers as a precaution against the spread of fungi!

So, please, follow the commonsense way of growing orchids, rather than the 'myth and mystery' methods or products of pseudo-science.

Noel J Grundon

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Rear cover: *Caladenia patersonii* R. Br.

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THE FIRST AUSTRALASIAN NATIVE ORCHID CONFERENCE AND SHOW
Wollongong 28 - 30 September 1990.

The First Australasian Native Orchid Conference and Show was a great success, one of the greatest showings ever observed of one country's native orchids in one place. Terrestrials, epiphytes, lithophytes, hybrids, species, the large, the small, the specimens; we most definitely have a very diverse orchid flora.

The Grand Champion of the Show, *Caladenia patersonii* (see rear cover) which was also the Champion Terrestrial Orchid, was owned by L & K Nesbitt. It was a superb, stately, true champion. The three very large flowers, carried on an upright stem, were a delicate white, with an almost mauvish tinge. The segments were broad at the base, tapering to fine points, while the wide labellum was well marked with four rows of dark purple calli, and with its margins fringed in purple.

The Reserve Champion of the Show, and the Champion Other *Dendrobium* was *Dendrobium* Elated (*D. macrophyllum* X *D.* Fiftieth State) owned by Kevin McFarlane. The flowers were a most delightful ice-green, well displayed on the raceme.

Col Brandon's *Dendrobium speciosum* 'National White' won Champion *Dendrobium* Species of the Show. It carried a many flowered upright raceme of well displayed, heavy substanced flowers.

Ken Russell's *Sarcochilus weinthalii* won Champion Sarcanthinae Species of the Show. What a charming orchid this is. It always stands out in a display and this was a top form, a good green with dark purple markings.

Other champions were:

Champion Other Epiphytic Species of the Show – *Cadetia chionantha* owned by Darryl Smedley.

Champion *Dendrobium* Hybrid of the Show (Section *Dendrocoryne* and Section *Rhizobium*) – *Dendrobium* Lynette Banks owned by M R Hill.

Champion *Sarcanthinae* Hybrid of the Show – *Plectorrhiza tridentata* x *Parasarcochilus spathulatus* owned by Michael Harrison.

Champion Terrestrial Hybrid of the Show – *Diuris* Pioneer 'Prince' owned by L & K Nesbitt.

Champion Specimen Epiphytic Orchid of the Show – *Sarcochilus* Weinhart owned by Neville Roper.

Champion Specimen Terrestrial of the Show – *Diuris punctata* owned by L & K Nesbitt.

Champion Floral Art Display of the Show and Marj Parnell Memorial Trophy for Floral Art won by Mrs Min Korsman.

The Marj Parnell Memorial Trophy for the Best Spatulata *Dendrobium* of the Show – *Dendrobium* Golden Chimes owned by Laurie Jarvis.

The Orchid Society of NSW Trophy for the Best Display – Display No. 7 by Bernie Fletcher, David Butler, Norm Biffin and Sid Batchelor.

The displays made the show, and all participants are to be congratulated. One could fill a book describing their beauty; much thought and loving care obviously went into their designs.

Deep appreciation is expressed to all competitors; without you we could not have had a show. To the Chairman of the Show Committee, Bill Crawford, and the Show Marshall, Alby King, I say two small words, but the feeling behind them can not be expressed on a piece of paper this size - Thank You - a great effort and a job well done.

Walter T Upton
P O Box 215, West Gosford, NSW 2250.

DATE CLAIMER: ORCHID SHOW

Ken Russell is again holding an ORCHID SHOW in Dungog. The date is **Sunday 19th May, 1991**, and the place is **The Show Ground, Abelard St, Dungog, NSW.** For those of you who attended the first one, I do not have to tell you what fun we had. All those who were anybody in native orchids were there, a real social occasion. The show was top class with entries from all the best growers. And this year, Ken tells me it is going to be even bigger and better.

Plants for sale – Big prizes – Refreshments available.

Your participation would be greatly appreciated by both Ken and ANOS, so bring plenty of plants along to display. For further information ring Ken or Noelene on (049) 92 1291.

Walter T Upton

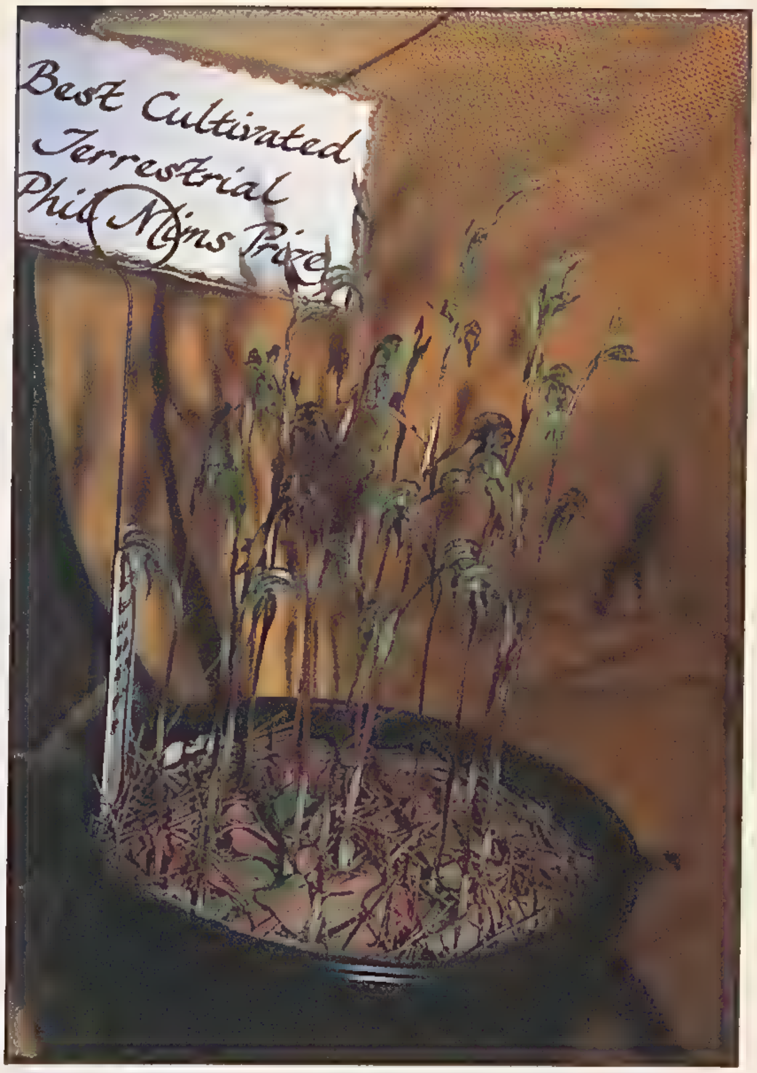
ANOS VICTORIAN GROUP 1990 SPRING SHOW REPORT

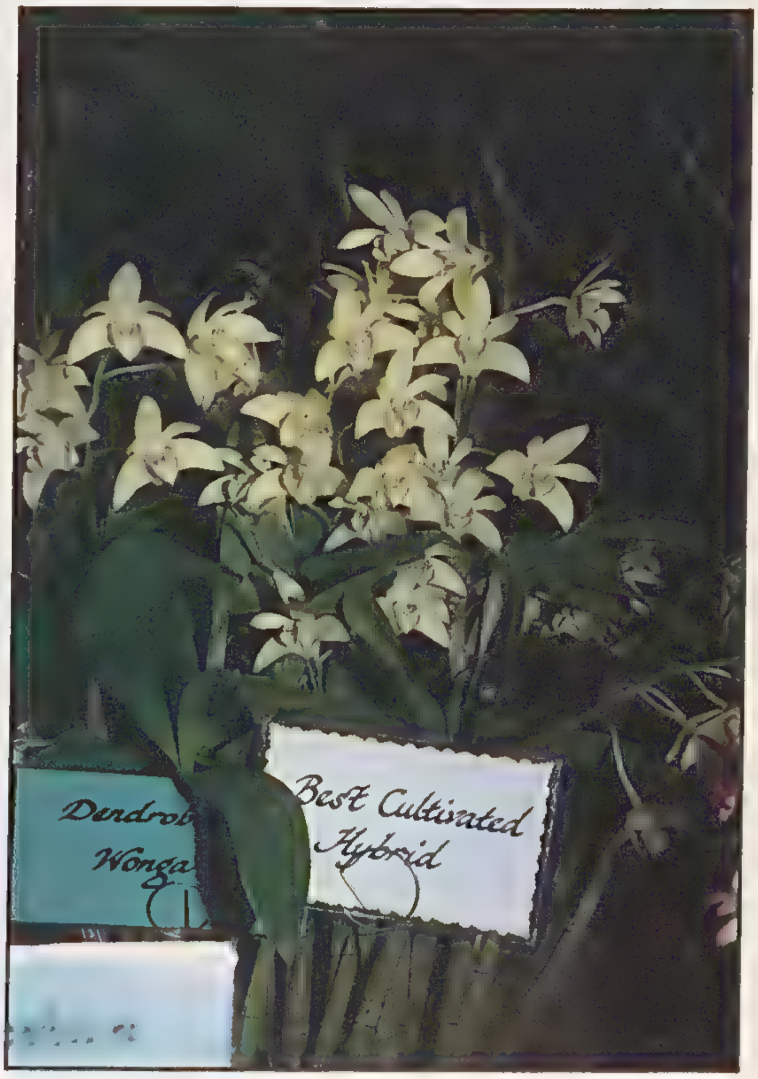
Each year, in September, Melbourne is gripped with 'Footy Fever' as the grand final of the Australian Football League draws ever closer, until, on the last Saturday of the month, the grand final determines the winner for the year. With this very popular event in mind, the Victorian Group carefully plan their Spring Show for the weekend after the AFL grand final. But this year was a little different! Owing to a draw in one of the preliminary finals, the grand final was postponed a week and clashed with the first day (the Saturday) of our Spring Show. Past experience has shown that this can cause some parking problems for our event, because the Melbourne Cricket Ground (where the finals are always played) is not too far from our venue.

Oh well, there was nothing we could do other than make sure our Show was well publicised, cross our fingers, and hope for the best. One very important thing in our favour was the weather – the weekend of the 6th and 7th of October was magnificent. Although I feel that the attendance on Saturday was probably a little below normal, it was not significantly so. And Sunday was such a brilliant day weather-wise that we found, overall, that numbers were better than those in previous years.

As is our usual practice, we reserved a tiered stand along one wall and another central tiered stand for the epiphytes. Along a second wall, another tiered stand was for terrestrials. However, the number of native terrestrial orchids grown by our members has increased dramatically, and we found that space on the central stand had to be relinquished to the terrestrial growers.

The massed displays in the Herbarium hall looked magnificent. The tiered benches allow the plants to be shown off to perfection. At each end of the central stand we had created little ferny glades to show off some of the larger plants on natural hosts and, amongst the ferns, early *Sarcochilus* glistened against the greenery.





Cultural Awards from ANOS Victorian Group 1990 Spring Show.

Top right: Fig. 2. Best Cultivated Terrestrial, *Pterostylis pusilla*, owned by Malcolm Thomas.

Bottom right: Fig. 3. Best Cultivated Hybrid, *Dendrobium* Wonga. Owned by Don Smith.

All photos by Lorie Peggie.

A group of experienced growers selected the following plants as worthy of cultural awards:

Malcolm Thomas took out the Phil Mims Prize for Best Cultivated Terrestrial with his *Pterostylis pusilla* (Fig. 2). Don Smith won the Best Cultivated Hybrid for his *Dendrobium* Wonga (Fig. 3). Olive and David Howard were awarded the Bill Murdoch Prize for the Best Cultivated Epiphyte for their *Dendrobium kingianum* 'Boundry King' (Fig. 4). Cultural certificates were awarded to: Stan Hill, *Dendrobium linguiforme* and *Dendrobium pugioniforme*; Olive and David Howard, *Dendrobium* Warrambool (Fig. 5); Frank Luckhurst, *Sarcochilus hartmannii* (southern form); Malcolm Thomas, *Caladenia marginata*, *Caladenia* species, *Microtis alba*, and *Pterostylis gibbosa*; and Ray Thompson, *Dendrobium falcorostrum.*

Helene Wild

56 Civic Parade, Seaholme, Victoria 3018.

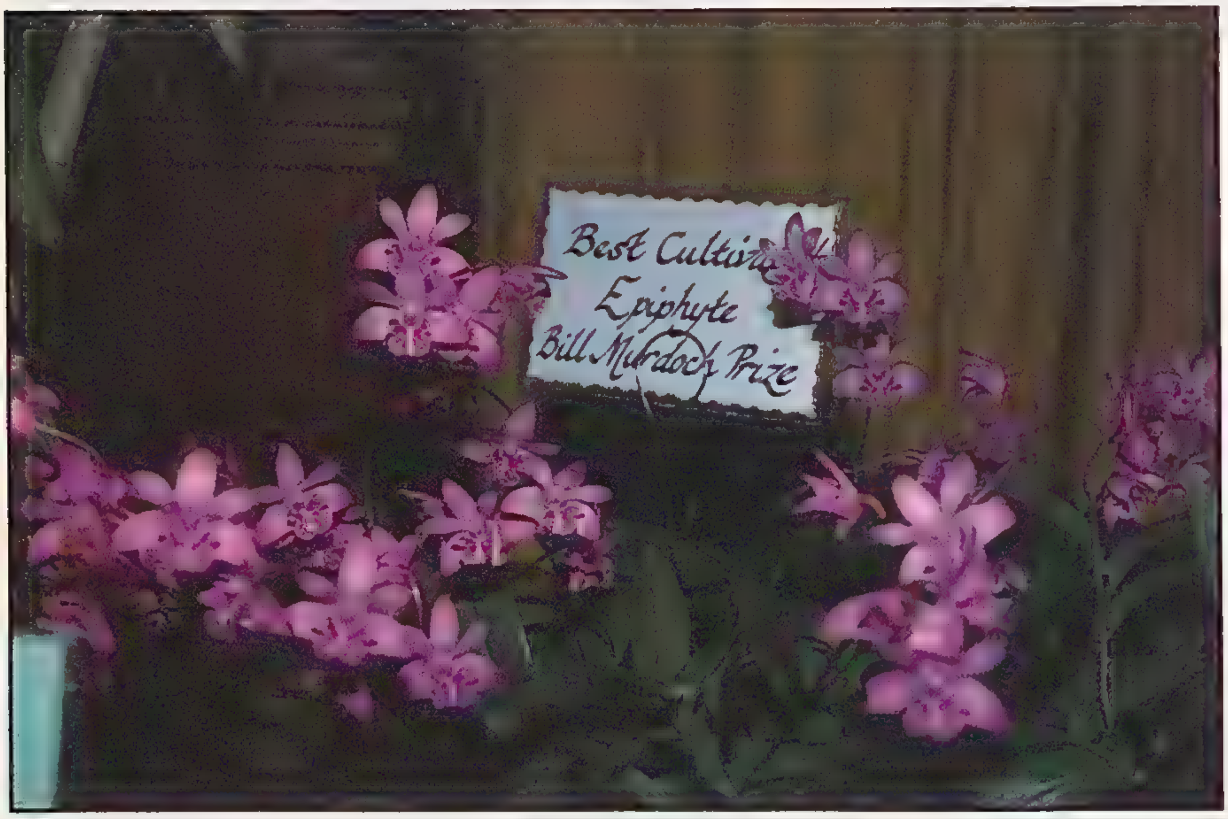


Fig. 4. Best Cultivated Epiphyte, *Dendrobium kingianum* 'Boundry King'. Owners Olive and David Howard.

Photo by Lorie Peggie.

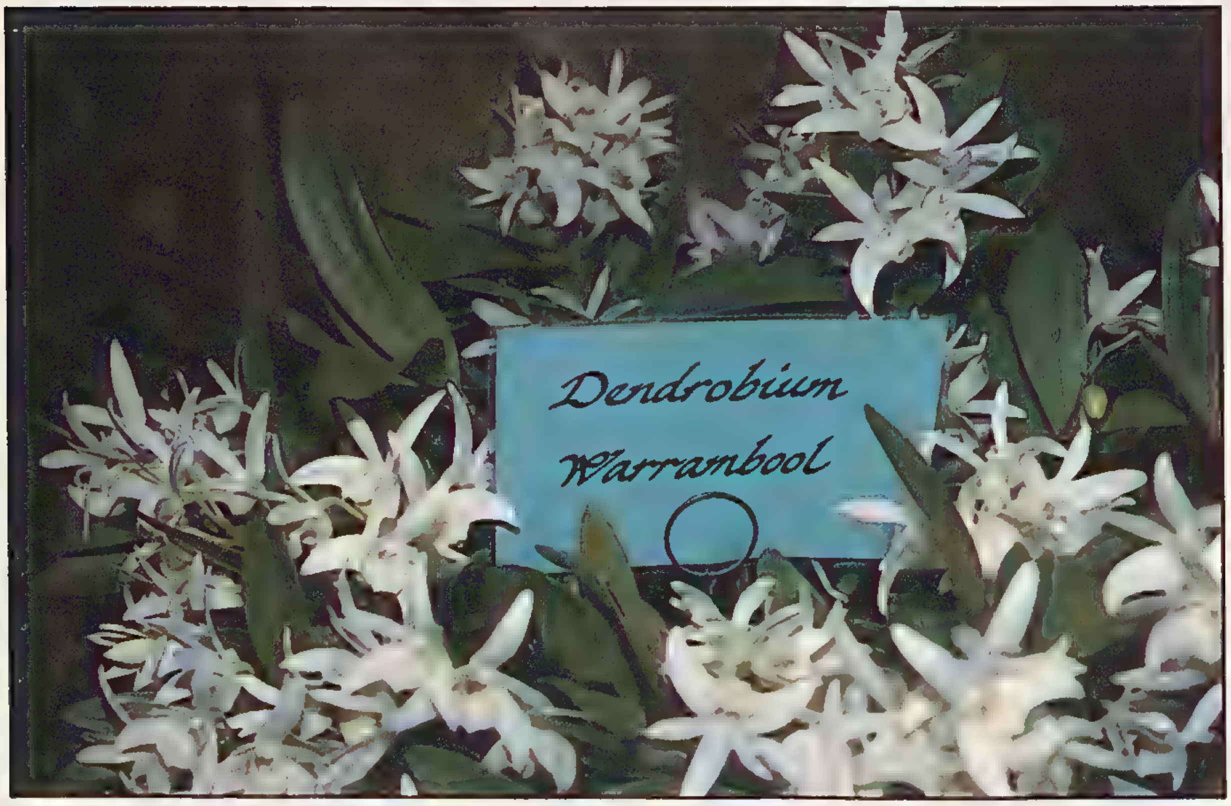


Fig. 5. Cultural Certificate awarded to *Dendrobium* Warrambool. Owners Olive and David Howard.

Photo by Lorie Peggie.

ORCHIDS IN FAR NORTH QUEENSLAND

L.J. Lawler
P O Box 58, Atherton, Queensland 4883

[Editor's note: This paper was presented at the First Australasian Native Orchid Conference, September 28 – 30, 1990, The University of Wollongong, Wollongong, NSW. It is published here with the permission of the author and the Council of ANOS Inc.]

To the lover of Australian orchids, North Queensland has always had a special appeal because of the variety and abundance of its orchids, amongst which are many of our most attractive species. I am now about halfway through an anticipated five-year project to record those orchids found from Mackay northward and to plot their distribution. Following some brief comments on the project, this paper goes on to convey some personal impressions formed during the survey.

INTRODUCTION

In the large sparsely-settled State of Queensland, botanical exploration has been limited (Bailey 1891, Maiden 1909). A detailed account of orchid discovery in North Queensland is that by Collins (1983), while Lavarack (1977, 1980, 1986) gives details for Cape York localities. Information at various levels on orchids of the far north may be found in some floras and orchid books, the most useful of which are Dockrill (1969), Lavarack and Gray (1985), and Jones (1988).

As a regular visitor to North Queensland since my Army posting near Proserpine in 1944, and a participant in two Australian Orchid Foundation excursions to the Iron Range area, I came to appreciate certain facts of life in North Queensland. In particular, I refer to the sparsely distributed population, the magnitude of area and distance, the variety of landform, and the ineluctable influence of the monsoon, specifically on plant growth and ground transport. Given the vast area to be covered, together with the complications associated with terrain and travel, as well as the limited botanical exploration in the past, I concluded that much more work remained to be done here, and resolved to devote five years of my retirement to surveying the area in depth. This undertaking is supported financially by the Australian Orchid Foundation and is sponsored by the Tropical Queensland Orchid Council whose constituent Societies and their individual members are according much valuable assistance.

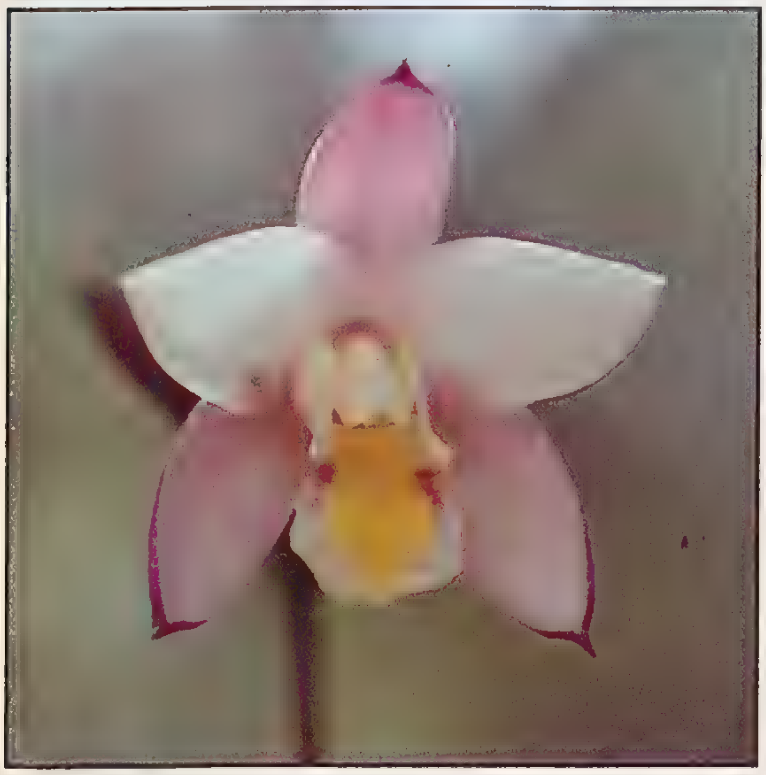


Fig. 6. *Bromheadia pulchra* Schltr. The sole representative of the genus in Australia, it also occurs in Papua New Guinea.
Photo by L. Lawler.

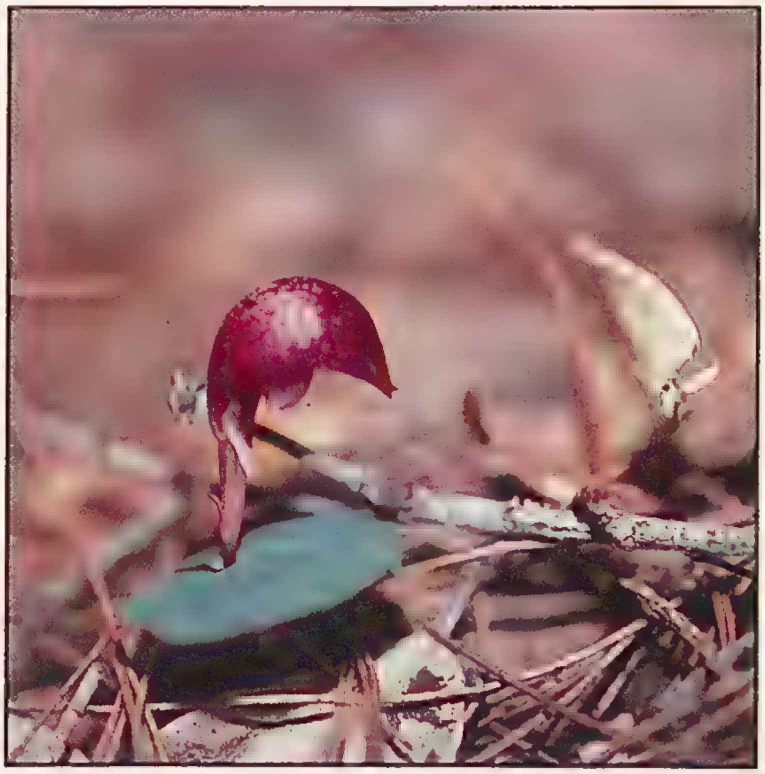
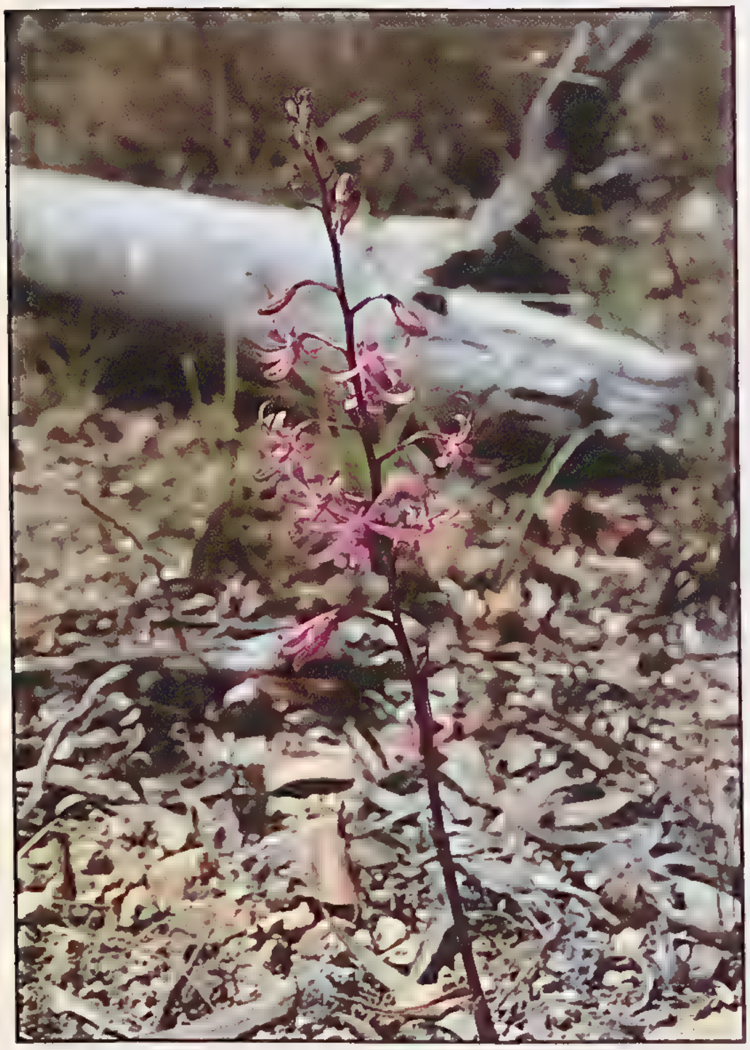
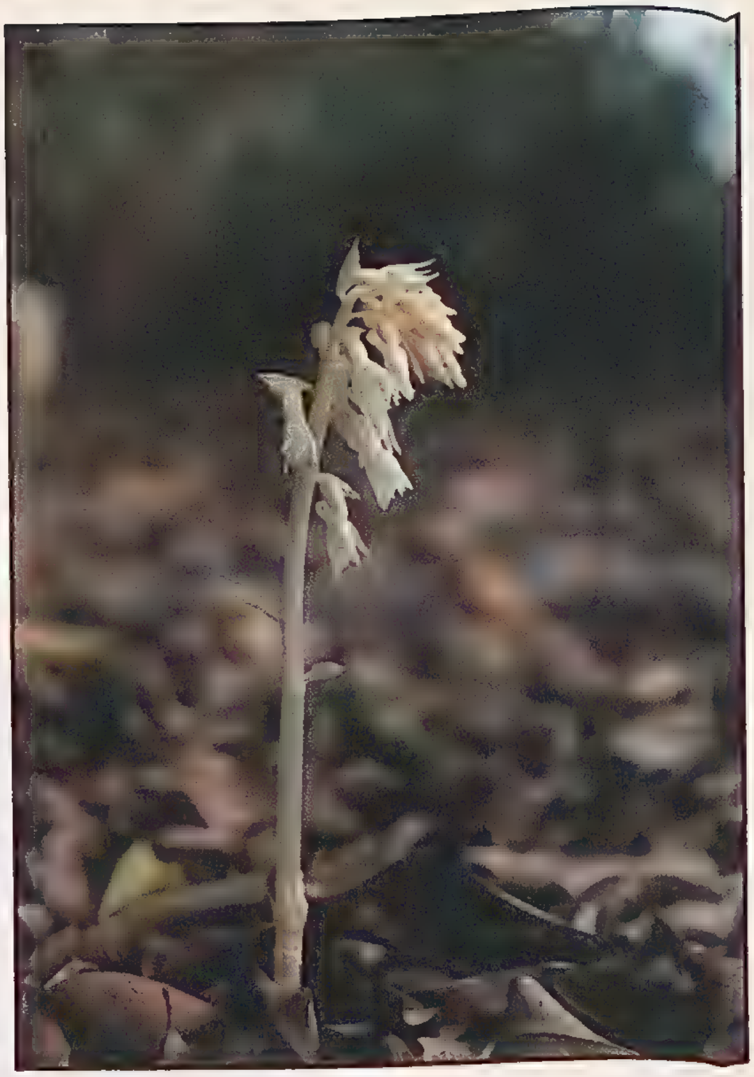


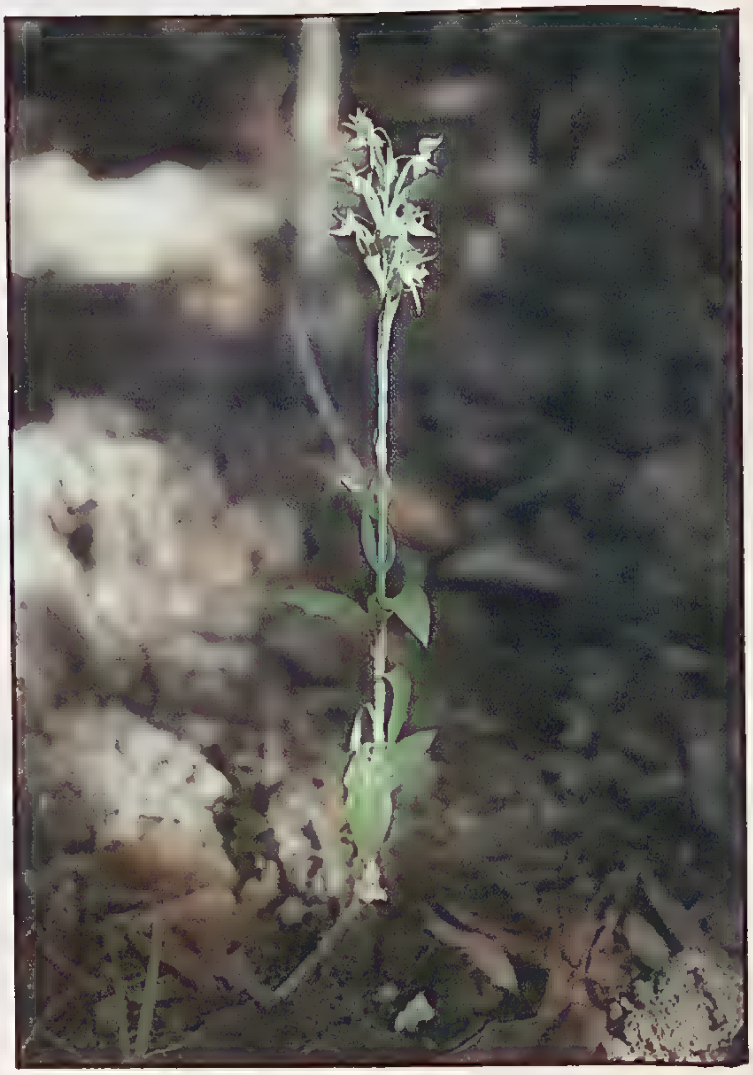
Fig. 7. *Corybas neocaledonicus* (Schltr.) Schltr. A recent find in Australia, it is also located in New Caledonia.
Photo by L. Lawler.

SURVEY OF ORCHIDS IN FAR NORTH QUEENSLAND

The principle of the survey is simple. If we have enough recorders who can make enough visits to enough places at enough of the right times, we will eventually record all the orchid locations in the area. In practice, what one hopes for is as complete a record as is possible. I keep in close touch with the Societies and the individual recorders and try to see as much in the field as I can. Many of the recorders are bushmen who like their finds to be verified. They may not know the botanical names, but they know their orchids and are most observant – they have to be if they work







Above: Fig. 8. *Dipodium* sp. A new species, possibly *Dipodium elegans,* once included in the taxon *Dipodium punctatum.*

Top right: Fig. 9. *Epipogium roseum* (D. Don) Lindley has a wide distribution on the mainland and islands of South-east Asia and the South-west Pacific.

Bottom right: Fig. 10. *Habenaria macraithii* Lavarack. A robust terrestrial of the rainforests of North Queensland.

All photos by L. Lawler.

in the bush. To date I have made over 160 field trips varying from half-day local ones to a 21-day excursion to Cape York Peninsula.

I am often questioned as to my personal feelings for the survey. On the one hand, the venture is most intrusive into everyday life, causing loss of time for other activities. There is a lot of driving involved, much of it on awful tracks which can be hard on both car and driver. It is also expensive as accommodation, vehicle maintenance, and repair costs are not cheap. Being in the field is often physically arduous and may be hazardous. So far, apart from a few sandflies, ticks and leeches, and three bouts of scrub itch, I have been lucky, having avoided stinging trees, and having had only one bad fall which miraculously left me unhurt. There must be a patron saint of orchid lovers. On the other hand, I have been fortunate in visiting some most interesting parts of the country, in meeting some wonderful people, and in seeing many beautiful orchids in their natural homes. I will deal in some detail with each of these – place, people and plants – in turn.

THE PLACES

A number of trips have taken me to some places as different from each other as they are far apart. I wish to mention several that have made an impression on me. I have visited the district around Cape York, both by land and by sea. To stand on the tip is of course very trendy, but nonetheless exhilarating. The immediate vicinity is special for orchid enthusiasts because the mainland and some islands still have plants of *Dendrobium X superbiens* to be seen. My first sight of this splendid orchid, a huge flowering plant growing just above high water mark, is a pleasant memory. To be anchored off Mount Adolphus Island at night with the promise of going ashore at first light was very stirring since we are led to believe this is the type locality for *D. bigibbum*. I got ashore and saw the plants, and felt I had made a pilgrimage to yet another orchid shrine. Soon after we anchored in the Escape River, and proceeded some distance upstream by dinghy. It rained incessantly, and ashore we were soaked as we sloshed our way through the dark forest. We were quite close to the spot where Kennedy was killed, and I felt ill-at-ease as his awful predicament intruded on my thoughts.

South of Cooktown, centred on Rossville, is the country of the Tin Scratchers who have left their romantic names scattered over the map. Mt. Romeo, The Big Tableland, Mt. Amos, Home Rule, Mt. Misery, Mt. Poverty, China Camp, the Roaring Meg and countless others were once thriving mines, and are now returning to the bush. This is magnificent orchid country, possibly the richest in all the north. Here hides *Malaxis lawlerii*, previously known from but one tiny locality, but now listed from several sites thanks to a diligent recorder.

Rainforest always inspires me, whether lowland at Cape Tribulation, Tully and Mossman Gorge, or highland on the Atherton, Evelyn and Windsor Tablelands, and Mt. Lewis, or the special rainforest of the McIlwraith Range and Iron Range. The relict areas, such as Hann Tableland and Forty-Mile Scrub, are most impressive in different ways. I have walked for three hours across the lava plain to arrive at a crater filled with rainforest – a veritable oasis, cool and moist, dripping with ferns and orchids.

Westward of the tablelands, over the Great Divide, are places with historic names such as Stannary Hills and Silvery Valley. Incredibly dry and hot, these areas are nonetheless host to orchids such as *Dendrobium speciosum* var. *pedunculatum* and *Sarcochilus roseus*.

From Cape York to Coopers Creek is about as far apart as one can get in Queensland. After the heavy rains last year which sent the Cooper down some 30 km wide, I determined to check the Channel Country for terrestrials. The ensuing trip through the outback from Winton down to Windorah was amid a garden of wildflowers, truly the desert in bloom, but no orchids.

THE PEOPLE

Some of the great names associated with native orchids are in the north. Alick Dockrill of Atherton needs no introduction. A little less sprightly, he still loves a jaunt in the bush where he enjoys terrestrials most of all. Jack Wilkie of Babinda, no longer running up Bartle Frere before breakfast, but still going strong, is a name well-known by all native orchid enthusiasts. Kenny Macpherson of Mt. Dryander near Proserpine, another old-timer in natives, still loves to get out, and is actively pursuing his long-term breeding programme using *Dendrobium discolor*. Mal Brown of Malanda spends his spare time in the field. A spell in the McIlwraith with Mal is the supreme experience for a native orchid lover.

The Atherton orchid circle suffered a loss when Ron Collins died in September 1989. Over many years, he and Bruce Gray had travelled extensively in the north, and located many new orchids. Bruce has finished his work on *Bulbophyllum* section *Oxysepalum*, and is now engaged in a revision of *Taeniophyllum* in Australia. John Clarkson, Queensland Herbarium's man in the north, has completed his biography of Dr. Hugo Flecker, and is now working on his plant survey of Cape York. Geoff Stocker, now retired from CSIRO, is growing and raising from seed New Guinea highland species of *Dendrobium* and allied genera. Mair Swann continues to paint native orchids and is compiling a portfolio of local species. Chris Godfrey and Tommy Wolfe are expert growers of native orchids, and flask seed of desirable species for conservation purposes.

From Townsville, Ray Robinson has been tracking down the rare species for many years, and Bill Lavarack continues to lead AOF expeditions to Cape York Peninsula and to publish extensively. John Nuss is President of the revived ANOS Group and is a diligent recorder.

THE PLANTS

During the course of my work I have seen over 200 different orchids, including nine which appear to be undescribed species. Some of these occur in large numbers, while of one species I have seen but a single plant. For various reasons, I have formed lasting impressions of particular plants, and I will now discuss a selection of these, in alphabetical order for convenience.

Acriopsis javanica Reinw. ex Blume has a wide distribution from Tenasserim, through Southeast Asia and Indonesia to New Guinea, then down the east coast of Queensland to about Tully. I find this orchid interesting in two ways. Firstly, it has a branched inflorescence, and secondly, it is a myrmecophilous (ant-loving) plant (Lawler, 1979). At the base of each plant is a mass of upward growing, aerial roots which collect detritus and harbour ants, providing shelter and perhaps food. In return, the ants protect the orchid from insect marauders.

Anoectochilus yatesiae Bailey belongs to a large genus of jewel orchids which ranges across eastern Asia from India, north to Japan, and east to Malaysia, Indonesia and New Guinea. The genus is grown in some areas for its leaves which were once used as pot-herbs in Malaya, nearly wiping out some of the best species. *A. yatesiae* is our sole representative of the genus and is indigenous. Apart from its beautifully marked leaves, it compels admiration for its tenacity in adhering to the rocky beds of runnels, often flooding with rushing water, where it grows in dense rainforest. I have seen this orchid growing also in leaf litter along a forestry track in such profusion that it was difficult to walk without damage to plants.

Bromheadia pulchra Schltr. (Fig. 6) is our sole representative of a small Indo-Malayan genus which grows in coastal swamps from Port Stewart north into New Guinea. While this orchid is seldom, if ever, seen in collections, I include it here because, in my opinion, it is one of the top four flowers of Australian native orchids. I have never seen a photograph that does it justice. I understand it will be available soon in flasks.

Corybas neocaledonicus (Schltr.) Schltr. (Fig. 7) was found in Australia fairly recently, being known from only the one location near Cooktown. It was thought to be a rare taxon in Australia. Further recordings have now been made, including some from the Atherton and Evelyn Tablelands where it can be locally common. Its range would seem to be from Rockhampton to Cooktown on the coast and ranges. It is clear that, in the past, this species has been confused with other taxa, and I include it here to make the point that a rarity can suddenly become common because someone takes the trouble to stop and look at it more closely.

Cymbidium canaliculatum R. Br. is included here because one of my specific tasks is to plot its inland boundary as it comes north from the tropic and turns across the bottom of the Gulf on its way through the Northern Territory to the Kimberleys. Observations to date, which I must stress are by no means complete or exhaustive, indicate that it follows a line somewhat west of the summit of the Great Divide until somewhat north of Hughenden, when it turns westward along the Gregory Range. Its northernmost point so far plotted is beyond Coen just below the Archer River roadhouse. Field observations do not support comments that this species is fastidious as to host trees. It can be found on a wide range of eucalypts, and also on trees of other genera. In some situations, it forms huge clumps; one such in full flower is a sight to behold.

Dendrobium agrostophyllum F. Muell. is an orchid of the higher country above 900 metres, where it is equally at home in open forest or rainforest. Its preferred host is *Casuarina* sp., but it abides other trees, and is almost exclusively a lithophyte at its highest elevation. This orchid is much admired for its pure yellow flowers. I find it of interest because it exhibits a relationship between altitude and size, such that as the altitude increases the stem lengthens, approaching two metres, and the flowers become slightly larger.

D. bigibbum Lindley, under which I group all sub-species, varieties, forms, etc., is one of the top four flowers of Australian native orchids. Under-rated and much neglected in its own country, it has been extensively used overseas as a parent. At one time there must have been untold numbers on Cape York Peninsula, but it has been reduced to near extinction point in much of its range. To have access to any area where hundreds of individuals in flower can be seen is a moving, and at the same time humbling, experience.

D. discolor Lindley is one of the most common orchids in the north, still to be found in huge colonies in some areas. Being common, it has been looked down on by many orchid fanciers, but not by all. Over many years, Kenny Macpherson has build up a collection of special clones, and has conducted an extensive breeding programme. A visit to his establishment is an education, and has inspired many others to look again at this common orchid. Essentially a lowland plant, it has lately been recorded at some distance from the coast, both in the high ranges and further west in the hot, dry country.

D. fleckeri Rupp et C. White has a discontinuous distribution in the very high country to the east and north of the Atherton Tableland. In the lowest part of its range, it overlaps with *D. adae* which is then at the highest part of the range. When not in flower, the two species may be indistinguishable from each other. As elevation increases, it changes from a comparatively tall, robust plant to a small, spindly one, until at its highest elevations it becomes a lithophyte, and attenuates and shrinks even more. The flower size is not affected by plant size but the colour may be deepened at higher elevations. It surprises me that an orchid so fastidious as to be found only on a series of mountain tops in a comparatively small area can be present in such numbers, for it is possible to find areas where the plants are so thick that one cannot avoid walking on them.

D. lobbii Teijsm. et Binnend. is an Indo-Malayan species which extends along the east coast of Queensland as far south as Cardwell. The first record in Australia was near Cardwell, and for some time this was the only known site, but although it is now known from several areas to the north, there is still a hiatus of 500 km between Cardwell and the McIlwraith Range. All authorities describe this species as terrestrial, but I suggest that it may be epiphytic on stems and roots of the herbs with which it always grows in close association.

D. luteocilium Rupp enters Queensland from New Guinea and extends down the east coast as far as Tully. The canes of this orchid can reach two metres in length, and a mature plant can be massive, which, no doubt, is one reason why it is seldom seen in collections. Despite the flowers being ephemeral, a large plant in full flower is quite striking. The first plant that I saw was adorned with a nest of the Mangrove Warbler (*Gerygone levigaster*), and the little birds added a certain charm (Lawler, 1977).

D. speciosum Smith var. ***pedunculatum*** Clemesha is the only taxon of the *D. speciosum* complex that is to be found west of the Atherton and Evelyn Tablelands. I can only wonder at the resources that enable this plant to exist in an area subject to extreme heat and aridity for a large part of each year. It does, in fact, flourish and colonises its harsh habitat, in the meanwhile producing handsome spikes of splendid flowers. The origin of this taxon and its relationship to other taxa of the complex are not yet understood. The reddish pigment that sometimes appears in pseudobulbs, leaves, peduncles and capsules may help to solve these problems.

D. teretifolium R. Br. var. ***fasciculatum*** Rupp (syn. *D. calamiforme* Lodd.) is the widespread pencil orchid of the north. There is some controversy over the taxonomy of this group of orchids and I am sure that it is not yet resolved. This orchid is notable for the luxuriance of its flowering. I have been watching a group on the Esplanade at Cairns for over 25 years, and when in full bloom they are a joy to behold. These plants are steadily increasing in size and improving with age. A specimen plant takes but a short time to grow, and should be in everyone's bush house.

D. wassellii S.T. Blake is an endemic species occurring only on the McIlwraith Range where it is quite common in the *Araucaria* vine forest. It grows on various trees but prefers hoop pine on which it may form quite large mats. It seems strange that this orchid has such a limited range in the wild, as it is most amenable to cultivation, even in cooler areas and in the south. It is easily grown, and soon increases to form large clumps. While individual flowers are small and dainty, it flowers abundantly, making a large plant most attractive.

Dipodium elegans (Fig. 8) is the northern saprophytic species once included in the taxon *D. punctatum*. This is one of the orchids most frequently recorded, perhaps because it is such an eye-catching plant. It occurs on the ranges and tablelands from Townsville to Portland Roads, and extends westward into very hot, dry country from Charters Towers across the basalt flow to Agate

Creek. Often growing in barren ground, of a rich colour and standing to one metre tall, it can be very striking, particularly when in a large group. Although there has been a shift in the meaning of "saprophyte", I still think of achlorophyllous plants as requiring a forest to supply rotting vegetation. It is impressive that this plant can exist in such inhospitable areas and successfully colonise them.

Epipogium roseum (D. Don) Lindley (Fig. 9) is the sole southern representative of a small saprophytic genus. It is widely distributed from Africa through India, Malesia, New Guinea, and down the east coast to the extreme north of New South Wales. The life cycle of this orchid above ground is intriguing, as the emergence of the inflorescence, flowering and dehiscence of the capsule all take place within four to seven days. It is reported that fertilisation of the flower occurs before the flower opens, and that the seed is the smallest of any orchid. Thought to be rare, this orchid is no doubt much more common, but seldom seen due to its brief existence above ground.

Eria fitzalanii F. Muell. and ***E. queenslandica*** Hunt are included here to extol the charms of this genus, of which the Australian representatives are all but ignored. Our species fall into two groups, large, represented by the first named, and small, represented by the second named. In comparison with their dendrobe relations, *Eria* flowers are rather small and nondescript, but this does not detract from their beauty. A well-flowered large species can be very eye-catching, and, while most of the small species have diminutive flowers on short racemes, they form extensive mats and the effect of massed flowers can be pleasing.

Gastrodia R. Br. is a genus previously known in the north from only one coastal species from the rainforest. We have now located a species in open forest which appears to be a new one for Australia (*Gastrodia urceolata* D.L. Jones.). I became interested in this genus during my earlier biochemical investigation of orchids when alkaloids were found in the tuber of *G. sesamoides*, which is the orchid most often reported as having been used for food in Australia (Lawler and Slaytor, 1969, 1970). At this time, I suspected that there were more than one species in Australia. On a subsequent trip to Tasmania I became familiar with this orchid, and my suspicion deepened. Investigations are in hand on the species of the south-east and south-west, and I was excited when I found the new species on the Herberton Range. There are reports of perhaps two other species in the north, and perhaps another two in southern Queensland. We may soon have up to nine good species if all these prove to be different.

Genoplesium R. Br. has now been reinstated as a genus, and we have found what appears to be a new species, at least for Queensland. Prasophylls have seldom been reported from the north. Dockrill's one recorded species can still be found in the same locality, and one has been recorded from Cardwell, but is not yet named. As well as these three, there is another definite new species awaiting description, and all of these are pygmy prasophylls. It is interesting that all the species so far located in the north are from the genus *Genoplesium*. Now that we have the experience of locating some, we may find more in the future.

Habenaria Willd. (see Fig. 10 for *H. macraithii* Lavarack) is a worldwide genus of the tropics and sub-tropics. It was once a repository for a very large number of species, some of which have been split off into related genera. There are several species in north-east Queensland, two of them extending south to the tropic. Together with the excised genus *Peristylus, Habenaria* is the Australian representative of Dressler's tribe *Orchideae* which contains the type genus, *Orchis*, and the other classical European genera on which orchid taxonomy is based. The flowers are always small, but none-the-less attractive; looked at front-on they always remind me of little men, as do many of the European orchids.

Nervilia holochila (F. Muell.) Schltr. is perhaps our most common member of the genus, occurring southward to Townsville and extending westward into the drier country. This was the first *Nervilia* that I had seen flowering, and it made a deep impression on me. I was walking on Mt. Adolphus Island in a blinding rainstorm, soaked to the skin, when I came across a large colony in flower. It occupied a modest depression in the rockshelf, protected by tall shrubs. Leaf litter had collected in the hollow which no doubt trapped water in the dry periods. There were several hundred plants in the colony, all bravely flowering in the deluge, and not one leaf to be seen.

Phaius tankervilleae (Banks et L'Herit.) Blume is included because it is one of my top four native orchids. This splendid orchid needs no introduction as it has been around for a long time, and its flowers are always much admired. Unfortunately, clones with good flowers are hard to come by as many self-pollinate, and only a fraction of the remainder are top quality. This has led to heavy collecting from the wild so that, once very common and widely distributed from northern

New South Wales to Cape York, this orchid is now seldom seen in nature. I was recently asked by an acquaintance to look at a "weird plant" on his small acreage. He had a good-sized colony of this orchid with tall spikes of well coloured, widely opening flowers.

Phalaenopsis rosenstromii Bailey is another of my top four natives; in fact I place it in first position. This orchid is widely distributed from Iron Range to Paluma Range, and, so I am told, did at one time occur on Mt. Elliott. Its distribution is quite discontinuous, and it has never been reported in many intermediate localities which would seem to provide an ideal habitat. It is not a common plant in any part of its range, but once had two separate areas of great abundance, namely Daintree and Mount Spec. The number of plants that have been removed from each of these areas must be very large. A casual inspection of the areas will not reveal any plants, but they are still there, well hidden. Those who know their secrets guard them jealously. Fortunately seed germinates readily, and flasks have been available for some time.

Pterostylis procera D. Jones et M. Clements is the name given to the plant from North Queensland that had been known as *P. baptistii.* There is certainly a strong superficial resemblance, and past workers may be forgiven for using an existing name. However, there is a lesson here, and it is to be expected that workers will now take a much longer look at their material before assigning it to a particular taxon. This orchid forms large colonies on the Great Divide and associated ranges to the west of Atherton and through the Evelyn Tableland to the ranges further south. Rarely it extends into the dry country, around creek beds and similar areas where there is water. The leaves and then the flowers are produced in response to the monsoon rains. I have been in an area where I was trampling plants underfoot; on my return the next (dry) year, I was unable to find more than a few plants.

Vanda hindsii Lindley, also a New Guinea species, occurs in isolated pockets on ranges north of Princess Charlotte Bay. The plant is scattered throughout its range, sometimes becoming locally common. It seems to grow equally well on exposed rock piles in full sun where it may be seen flowering merrily, or in quite wet areas along creeks in vine forest where it may grow into great tangled masses which show little evidence of frequent flowering. While the flowers are not as bold and colourful as some exotic species, they are attractive nevertheless, and a well-flowered plant is quite splendid. A pale yellow clone which comes true from seed has been found in the McIlwraith Range.

Zeuxine oblonga R. Rogers et C. White is our most common jewel orchid. It is widespread along the tropical coast of Queensland where it grows exclusively in rainforest. There is nothing spectacular about this orchid, either in its lightly-veined leaves or its small and rather dingy flowers. Nevertheless, I have included it here because the sheer numbers in which it sometimes occurs can be impressive. It sets seed freely, and given the right conditions can produce an enormous number of seedlings which flower when quite young. Old tracks in rainforest which admit filtered sunlight offer ideal conditions, and hundreds of plants may sometimes be encountered in these circumstances.

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RON COLLINS: A TRIBUTE FROM NEW ZEALAND

Brian Molloy
Botany Division, DSIR, Lincoln Private Mailbag, Christchurch, New Zealand.

One is always saddened by the loss of a fellow orchid enthusiast. And so it was when I read the Reverend Ron Collin's obituary, thoughtfully written for *The Orchadian* (Vol. 9(11): 1990) by Len Lawler and Bruce and Joy Gray. I met Ron just the once and all too briefly, but my impressions of this knowledgeable and kindly man will endure.

How did I meet this man of the north? Well, I had arranged with Bernie Hyland of CSIRO to visit the McIlwraith Range in October 1986 to study a northern outlying population of *Corynocarpus cribbianus*, a tree related to the Karaka (*C. laevigatus*) of New Zealand. While Bernie and party, including Ron Collins, drove overland to Coen, I took the easier option and flew from Cairns with the renowned Queensland Airlines. At Coen I was met by Ron and his friend Peter McLain from down Townsville way. I was instantly taken by Ron's friendly manner as we headed into the McIlwraith Range to find an old campsite of theirs at Lankelly Creek and await the arrival of Bernie Hyland and Bruce Gray. As we drove steadily but surely in Ron's trusty vehicle I was soon overwhelmed by the fund of information which quietly flowed from this outback enthusiast. I was impressed too by the knowledge this well-read man had of New Zealand.

For the next two days we explored the catchment of Lankelly Creek searching for the elusive *Corynocarpus*. Needless to say we found it, much to my satisfaction and enlightenment. Meantime, while Bernie and Bruce were gathering fruit from numerous vines in their tree-top perches, using their effective shanghais, Ron and Peter were busy orchid hunting and setting up a constant chatter over the relative merits of different species. I do not believe we saw Ron's namesake, *Cadetia collinsii*, but we certainly saw plenty of others. Not surprisingly, most of the genera were unfamiliar to me, coming from a country dominated by temperate terrestrials. Aside from the orchids, there were other lessons to learn such as "don't sit there", and "don't touch that". This is always a new experience for someone from New Zealand where the only dangerous beasties are the recent Aussie migrant Redback spider and our native counterpart, the Katipo.

Evenings back at camp were memorable. With our bodies cooled and quenched by "stubbies", and good food in our bellies, we eagerly engaged in wide-ranging discussions far into the night. Ron was a central figure in these discussions which tended to be drawn out rather than cut short by the occasional draught of "Black Bundy".

I left Coen aerodrome as I had arrived, warmly clasping the hand of Ron Collins, field naturalist and gentleman extraordinaire. After I returned home I sent him seed of *Dendrobium cunninghamii* which he was keen to grow. The seed arrived safely and he succeeded in germinating it. However, I still do not know whether or not the plants matured and flowered for him. Perhaps Bruce Gray knows?

People like Ron Collins are the stuff of fieldwork and natural history. I am privileged to have met and learned from him, and, although our meeting was brief, I am certainly the wiser and richer for it. If I visit North Queensland again and the people there ask, "Did you ever meet Ron Collins?", I can say, "Yes, I surely did. He was my friend".

READERS' FORUM

Conservation or Preservation

Dear Editor,

I'm confused. Those who know me will probably say, "So what's new?". Firstly, we have 'CONSERVATION', the word which is the flavour of the decade; then we have what others generally call 'PRESERVATION', but what I call conservation.

I agree whole-heartedly with flasking seed from rarer species, and endeavouring to re-establish the plants near their original habitat. Perhaps some could be made available to enthusiasts by ballot or at special sales. Restrictions could be made on the number that any person or group could purchase to prevent skyrocketing prices and market cornering. Proceeds from sales could be ploughed back into the flasking. Hopefully, these sales would reduce plundering of bush plants. At this point there is little difference between attitudes of conservation and preservation.

The contention arises in the rescue of plants endangered by development. Provided the correct permits are held, and subject to permission of owners or managers of the land in question, I feel that every effort should be made to save all orchids that are endangered, and either relocate or distribute the plants amongst enthusiasts. To me, that is preservation. If some of the plants die in the hands of those learning to grow them, we are no worse off.

On the other hand, The National Parks and Wildlife Service feels that, if a tree falls, no attempt should be made to save the orchids by re-establishment. They claim that attrition of orchid colonies has travelled that path for centuries, and should be allowed to continue.

Isn't that tantamount to saying that the polio bugs, smallpox, yellow fever, etc., contribute to the natural attrition of the human race, and should not be eradicated so that we can maintain our balance in nature?

A salvage operation was criticised recently on the basis that all orchids in that area were common. The conservationists recommended that the plants be left where they were and destroyed. Rupp quotes as common, many species which no longer fall into that category.

Another 'conservationist' stated that only 10% of any colony should be relocated, and that the rest should be destroyed. When questioned, the explanation given was that, if a large number of plants were moved to a new area, the pollinator populations would be over-taxed and unable to cope.

It is my understanding that survival in the entomological world is partly due to their ability to adapt to conditions. Birth-rates are increased in good times, and populations reduced in lean times.

These adaptations do not occur overnight, but plants do not need to be pollinated every year. Provided the new plants are located near other orchids of the same species, then pollinator populations should adjust to suit any increase in plant number.

Some people say that, if we salvage all these orchids, we will eventually cause imbalance. Why? These are plants which would have survived and reproduced naturally if we had not endangered them from development. The survival areas are becoming smaller, but if we can decrease the areas being taken over by exotic weeds there would be more room for orchids.

If conservationists can not show me the error of my ways, then I do not wish to be a conservationist. If I am wrong in my understanding, then please correct me, not verbally, but through the pages of *The Orchadian* so that all the other confused growers may also benefit.

Yours sincerely,

Reg Angus

55 Campbell Ave, Dee Why NSW 2099.

New record for *Arthrochilus irritabilis*?

Dear Editor,

I felt that some of the readers may be interested in the find of a substantial colony of *Arthrochilus irritabilis* near Bilgola, on Sydney's northern beaches. Apparently, Nicholls recorded this species in the Sydney area in the 1930's under the name *Spiculea irritabilis*. While there have been some reported sightings of plants, there is no record at the National Herbarium of the genus south of Raymond Terrace and Freeman's Waterhole, NSW.

Yours sincerely,

Reg Angus

55 Campbell Ave., Dee Why NSW 2099.

Dendrobium aemulum in the Illawarra

Dear Editor,

I wish to add a short comment to the fine article by Gerry Walsh, "The Epiphytic Orchids of the Illawarra" (*The Orchadian* 10(1), 16-23). *Dendrobium aemulum* certainly does occur in Kangaroo Valley. Each year for many years I have admired and photographed a colony which is spread over quite a few trees of various species. It was badly affected by the severe bush fires several years ago but is slowly regenerating.

Ross Berglund

65 Minimbah Road, Northbridge NSW 2063.

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AUSTRALIAN NATIVE ORCHID HYBRIDS

(New registrations from lists in *The Orchid Review*, July 1990 to January 1991. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review.)*

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Allara	Graham Hewitt x Hilda Poxon	N.E. Roper
Alpha Centauri	*falcorostrum* x *ruppianum*	D.B. Lynch
Dream Girl	*kingianum* x Peter Hewitt	R. & D. Sheen
Elegant Lace	Peewee x Ira's Star	W. Upton
Frank Booth	*dicuphum* x *carronii*	F. Booth (R. Perreira)
Galah	Peewee x Golden Fleck	W. Upton
Gold Vista	*falcorostrum* x Ku-Ring-Gai	R. & D. Sheen
Purple Imp	Pixie x *kingianum*	W. Upton
Red River	Ellen x Tweed	N.E. Roper
Wykar	Wyuna x Karloo	N.E. Roper
Yondi Pioneer	Aussie Bonanza x Star of Gold	S. Batchelor
Parachilus		
Frances	*Sarco. ceciliae* x *Psarco. hirticalcar*	W. Upton
Rhinochilus		
Judith Larsen	*Rhin. divitiflora* x *Sarco.* Canary	Simpson Orch. (K. Russell)
Sarcochilus		
Cherie	Fitzhart x *fitzgeraldii*	W. Upton
Zillie	Lois x Heidi	N.E. Roper

IN SEARCH OF THE ORCHID MAN: THE REVEREND H.M.R. RUPP, 1872-1956

Lionel Gilbert
151 Brown St., Armidale NSW 2350.

In August 1985, there came a request to write 500 words on the orchidologist, H.M.R. Rupp, for the Australian Dictionary of Biography. Similar requests had been met for brief biographies of such notables as Sir Joseph Banks, Daniel Carl Solander, Ferdinand Bauer and Robert David FitzGerald, but here at last was the opportunity to write about a naturalist whom I had actually met, and with whom I had corresponded nearly forty years before. So began the search for the Orchid Man.

FIRST MEETING

It was interesting to recall our first meeting in 1946 or 1947, when I presented myself at the fine old cedar counter ("the enquiry desk") at the National Herbarium of NSW in Sydney's pre-Royal Botanic Gardens. With mixed feelings of pride and diffidence, I displayed a reconstructed specimen of a previously disarticulated disaster, the leaves, flowers and shrunken pseudobulbs of an epiphytic orchid collected with some difficulty from a giant paper-bark tree near a Darwin radar station in the closing days of the War.

I requested an identification of this little treasure. "Ah, you had better see our Orchid Man about that one", I was told. Then, to my astonishment, I was invited through the cedar barrier which divided the secular and scientific worlds, and ushered through the labyrinth of passages, stairways and alcoves which comprised the inner sanctum.

To an uninitiated outsider, this was a wondrous place, packed from floors to ornate ceilings with white cardboard herbarium boxes; it was intriguingly gloomy, being lit by means of somewhat obstructed windows and incandescent lights of modest wattage, and the whole place was mystically scented by naphthalene. In one small clearing, slightly fogged by the haze of forbidden tobacco smoke, was a specimen-laden table (doubtless also of cedar) where a benign-looking, faintly-smiling bespectacled gentleman in a dark suit was peering at a herbarium sheet. I was then introduced to the Reverend H.M.R. Rupp, clearly "our Orchid Man", as "someone with a query".

After some introductory pleasantries, I was asked about the orchid's place of origin and habitat, the colour and scent of the living flowers and the degree of its occurrence. Then the Orchid Man looked carefully at the specimen and quietly remarked, "It's probably *Dendrobium dicuphum*". There was a pause, during which I felt inadequate to make any contribution, then another examination, some brief reflection, both with and without a small hand lens, all accompanied by some vigorous drawing on a well-stoked pipe. Then with sudden conviction, the Orchid Man swept off his glasses, peered again at the specimen and enthusiastically confirmed the earlier diagnosis, "Oh, it IS *dicuphum* - no doubt about it!"

The Orchid Man had spoken. It was an electric moment to witness such decisiveness. Even if later investigators have declared that *Dendrobium dicuphum* F.Muell. is synonymous with *D. affine* (Decne.) Steud., I had seen the Orchid Man at work and his determination was good enough for me. We corresponded about orchids for ten years thereafter; had I but known it, I could have asked him about his youthful reaction to the capture of Ned Kelly; what it was like to have had Henry Handel Richardson as a school-mate; and what he and Baron Ferdinand von Mueller talked about when, over fifty years before, the Baron had regaled him with lemonade and biscuits!

THE ORCHID MAN

The 500-word article was duly compiled, but then it was learned that Rupp's daughter, Mrs Rachel Cox, lived in Armidale, where I had resided for some 25 years! Clearly the brief biography should be submitted for a family *imprimatur* before it was sent to Canberra. Happily this presented no problem, for Mrs Cox had in fact assisted my old friend Dr James Willis in 1956 when he wrote an admirable obituary of Rupp for the *Victorian Naturalist*. This obituary, and the Rupp papers in the Herbarium Library, had provided the principal sources. Then events took a new and exciting course.

Having read the draft article on her father and approved of it, Mrs Cox casually remarked that she had "a couple of things which may be of interest". She left the room, and returned with the kind of material historians dream about. There were two documents, both Rupp's autobiographies, one compiled in 1932-1933 and recorded in the Orchid Man's characteristically neat manuscript; the other compiled in 1948-1949 (with subsequent amendments) and recorded in his meticulous typescript. Rupp had long since pipped to the post any prospective biographer. The former document, of about 17,000 words dealt chiefly with Rupp's botanical activities, while the other (about 35,000 words) written after more reflection, surveyed his long life in a more general way.

Even a cursory examination indicated that both works had been written for publication, subsequently confirmed by evidence found in Rupp's correspondence, but neither had been to a printer. Clearly it was highly desirable that both accounts, each written at a different time to tell a different story to different interest-groups, should at last be published.

While full of interest and lucidly written, Rupp's memoirs called for some annotation to provide the general reader with additional information about the multitude of people, places and plants he mentioned. Revisers who have been active since Rupp's death in 1956, had ensured that much of the botanical nomenclature needed careful checking, and there were some aspects of his background, life and work upon which he did not dwell, yet which are of intrinsic interest and of significance in appreciating the stories he wrote. Thus in searching for the Orchid Man, there was necessarily a search for his German forebears, his friends and correspondents, localities with which he was associated and the plants to which he devoted virtually all of his leisure time.

Apart from the memoirs and prodigious output of scientific papers, there was another, and major, side of Rupp's writing. The orchidological parson was the consummate correspondent, who developed a network of botanical pen-friends throughout the country. As he confessed to one of them (Fred Fordham) in June 1933, "one of life's pleasures for me is corresponding with orchidy folks". The memoirs, fascinating in their own right to anyone interested in botany (more especially in orchids) or in natural history generally, or in local or ecclesiastical history, or in biography or reminiscence, are therefore richly supplemented by a mass of Rupp's correspondence. Fortunately, Mr Don Blaxell, Assistant Director of the Royal

Botanic Gardens, Sydney, and known to many orchid fanciers, some years ago began to develop a collection of copies or originals of Rupp's letters. The quest was very successful, and one is able to appreciate something of the pleasure that Rupp described.

In addition to pleasant literary conversation, Rupp shared his knowledge with any enquirer, and exchanged information and specimens with a vigour that must have caused wonderment in many a postman. The correspondents comprised an observant botanical "intelligence network" providing material from places he could not hope to visit. Rupp's pen-friends were well-chosen, warmly encouraged and carefully cultivated; they were also highly valued and affectionately regarded. In initiating correspondence with George Vance Scammell in April 1926, Rupp cheerfully declared, "once I get hold of a botanical correspondent I like to keep him!" Scammell, who soon became director of F.H. Faulding and Company, provided most of the line drawings for Rupp's *The Orchids of New South Wales*, published in 1943. During their first four and a half years of writing, Rupp and Scammell exchanged some seventy letters, at least.

While Rupp's letters were invariably newsy, often illustrated with botanical sketches and frequently spiced with his delicious sense of humour, they were above all informative. Consequently most correspondents kept their letters for reference, and fortunately some who subsequently came into possession of Rupp's letters have appreciated their value. The number of letters, both "incoming" and "outgoing", which have been regrettably destroyed, is not known, but the indications are that it was probably enormous.

The more significant collections of Rupp's letters still preserved, include 388 letters (1941-1955) from Rupp to Trevor Edgar Hunt, a well-known Ipswich schoolmaster; 227 letters (1931-1956) to the headmaster of Brunswick Heads Public School, Fred Fordham; 184 letters (1942-1956) to Dr James H. Willis, former Assistant Government Botanist of Victoria; 80 letters (1945-1955) to George William Althofer, nurseryman of Dripstone, near Wellington, NSW; 55 letters (1924-1948) to Alec H. Chisholm the well known journalist/naturalist, and 48 letters to the celebrated artist/orchidologist of Melbourne, William Henry Nicholls. I was privileged to receive 32 letters between June 1947 and June 1956, while Miss Isobel Kendall Bowden, a keen amateur orchidologist of the Blue Mountains, received 41 letters between June 1947 and November 1955. These figures are of course based on the collections which survive; it is quite likely that many of the existing sequences are incomplete.

Other correspondents included Adam Forster, the wildflower artist of Sydney, the naturalist Alexander Greenlaw Hamilton of Sydney, Professor Alfred James Ewart of the Botany Department, University of Melbourne, and even the classics master of his old School, Geelong Grammar, the poet James Lister Cuthbertson. Rupp also made contact with Kew Gardens, and in the course of his normal work, with many sundry bishops and diocesan officials to whom he wrote at least 250 letters which are still on file.

An essential part of the search for the Orchid Man, was a search for yet more papers. Letters and other records, including botanical sketches were found in several interesting places: the archives of both Trinity College and the Archdiocese of Melbourne; the Sydney Botanic Gardens, where Rupp worked as Honorary Curator of Orchids after his retirement, 1939-1956; the library of the Australian Board of Missions in Sydney; and the archives of the Diocese of Newcastle in the University of that city. Contact was also made with Geelong Grammar School, where the archivist, Mr Michael D. Collins Persse, located many items of interest, including photographs and some of Rupp's earliest writing in the School's magazines. There was also the pleasure of travelling to Noosa Heads to meet and to initiate correspondence with Rupp's younger daughter, Mrs Eileen Cox (d.1989) and to Willoughby to see Rupp's last home, where his son Mr Arthur Rupp (d.1990) and granddaughter, Miss Elizabeth Rupp generously treated me to a feast of documentary material and photographs relating to the family.

A further pleasure was to locate four ladies who had taken a great interest in Rupp's work. As a result of trips to southern Queensland and to the Blue Mountains, over 150 original letters and over 100 of Rupp's original orchid sketches were generously presented to the central collection in the library of the Royal Botanic Gardens, Sydney. And as the result of a telephone call one evening from a lady living north-west of Sydney, an excited biographer drove down from Armidale to borrow the original letters Rupp received from Baron von Mueller in the summer of 1894-1895! Dr Willis most generously made available another 290 letters which he had taken care to preserve.

It was natural that the consummate correspondent should also be an inveterate contributor to newspapers and scientific journals. Thus began another search, this time for published material.

Fortunately, Dr Willis had in 1956-1957 joined forces with Mr Knowles Mair, who became Director of the Sydney Botanic Gardens, to compile a bibliography of Rupp's scientific papers. Dr Willis kindly sent me the results of this work (which even Rupp himself had found difficult!) suggesting that it might be rearranged, and indeed supplemented, should further discoveries be made. Rupp's correspondence made it clear that during lean times, he had tried his hand as a free-lance writer of articles on orchids and other aspects of natural history for the *Sydney Mail*, the Melbourne *Australasian* and the *Australian Woman's Mirror*, which was published in Sydney by *The Bulletin*. Microfilm searches and perusal of files of the *Newcastle Diocesan Churchman* added another 112 items to Dr Willis's list which already contained Rupp's two books on orchids, and 223 papers in scientific journals.

At the geographical level, the search led to many fascinating places: Port Fairy, Victoria, to see the former vicarage where Rupp was born in December 1872, the fine Church of St. John where he was christened Herman Montague Rucker, and the cemetery where his mother was buried in January 1873; Koroit, where in the old vicarage Rupp's stepmother, Rachel, conducted a small school attended by Rupp and his sister, together with the postmistress's two daughters, one of whom became the novelist, Henry Handel Richardson; Tower Hill to see the crater lake and island where Rupp enjoyed excursions in his childhood; Coleraine, Wannon Falls, and Buninyong where Rupp made some of his earliest plant collections; Geelong, where he attended both the Junior Grammar and the "big" school, run by his uncle, the celebrated naturalist, John Bracebridge Wilson; Trinity College, Melbourne where Rupp was a student; the Department of Botany at the University of Melbourne, where the non-orchidaceous part of Rupp's herbarium is still preserved; St Paul's Cathedral, Melbourne, where Rupp was made deacon in 1899 and St Peter's Church, Ballarat where he was ordained priest in 1901; Beeac and Colac where he served as Stipendiary Reader and Curate; Tamworth, Copmanhurst, Barraba, Bulahdelah, Paterson, Weston and other places where he ministered to the local people and sought out the local orchids; with a special visit to St John's Church, Tamworth, where Rupp served as Senior Curate and where, in December 1904, he married Florence Mabel Dowe.

In assembling, sifting and utilising the rather vast amount of material which had been obtained, it was considered that the Orchid Man should tell his own story in the ways he had intended to do so. The material obtained from archival sources, newspapers, personal interviews, Rupp's publications and the enormous collection of some 1600 existing letters, has been used to compile a biographical study of the Orchid Man, "from the outside" as it were. Nine chapters trace the Rupp story from the emigrant ship *Wappaus* and the cholera epidemic at Hamburg in 1848 to the arrival of two young German orphans (one of them Rupp's father) in Melbourne the following year, and their adoption by the merchant from Dresden, W.F.A. Rucker; from H.M.R. Rupp's birth in the old vicarage at Port Fairy (then called Belfast) to his death nearly 84 years later at Mosman in September 1956. Rupp's scientific work on orchids waited a long time for recognition, but it finally came, first in 1949 in the form of the Clarke Medal from the Royal Society of New South Wales, and then in 1955 with the award of the Australian Natural History Medallion. This story, with a Bibliography of Rupp's works, comprises Volume I.

After light editing and with adequate annotation, the two autobiographical accounts remain virtually as Rupp wrote them, with the addition of references and photographs. These, together with a Supplement of Rupp's sketches of orchids, comprise Volume II.

The Orchid Man emerges as a faithful and compassionate country parson almost in the pattern of the 19th-century clergyman/naturalist of England. If in the eyes of some he was "one of those wicked High Churchmen", he appears to have been a good preacher and counsellor and one who inspired both trust and support. As a scientist he worked on a shoe-string budget with rudimentary materials and equipment, yet he made highly significant contributions to the taxonomy of our native orchids in accordance with the knowledge and practice of his time. He was a true amateur, in the sense that he truly loved his orchid studies, even while he waged constant war against droughts and frosts, snails, slugs and slaters, millipedes, and even rats, all of which, in due season threatened his beloved plants in a succession of rectory bushhouses. Forthright in religious and political, as well as in botanical matters, he was withal charitable, and willing to concede that there might be other points of view.

The Search for the Orchid Man has proved to be fascinating; the search for a publisher has so far proved to be frustrating. No doubt the Orchid Man would have a reassuring explanation.

HONOURS TO AUSTRALASIAN ORCHID PEOPLE

G. Hermon Slade

At the ANOS Conference Banquet, Dr Phillip Cribb, on behalf of the Director of the Royal Botanic Gardens, Kew, presented G. Hermon Slade, with an Honorary Research Associate in Orchid Science Certificate. This presentation was made to recognise the years of dedicated support given by Herman Slade to orchid research. Only two other persons have been similarly honoured, Gunnar Seidenfaden and Carlyle Luer, both noted and eminent people in the orchid world.

Alick William Dockrill

The Directors of the Australian Orchid Foundation have granted Alick William Dockrill the Australian Orchid Foundation Award of Honour. This award recognises a lifetime spent observing and recording accurate details of orchids in New South Wales, Queensland, and Papua New Guinea. Alick Dockrill is the author of *Australian Sarcanthinae* and *Australian Indigenous Orchids*. He also provided notes and illustrations for *Tropical Orchids of Australia* by P.S. Lavarack and B. Gray, has described four new orchid genera and numerous new orchid species. For many years, Alick Dockrill held the post of Curator at the Herbarium, Lae PNG, with memorable distinction.

Noel Grundon

BOOK REVIEW

The A & R Field Guide to Australian Orchids

By Margaret Hodgson and Roland Paine. Angus and Robertson Publishers. Recommended Retail Price: $34.95

Yet another book on our beloved Australian Native Orchids. Unfortunately, however, *The A & R Field Guide to Australian Orchids* has nothing new to offer. Over 360 species - both epiphytes and terrestrials - are depicted in the 280 page book. Each species is accompanied by a stylised coloured drawing, an abridged description, general distribution details and flowering time.

Many of the illustrations, whilst attractive, are botanically incorrect. In fact, it would be difficult to identify many species from the information in this book. This, to my mind, defeats the purpose of a field guide. A number of the *Sarcanthinae* (*i.e. Sarcochilus fitzgeraldii, S. hartmannii, S. moorei* and *S. olivaceus*) show the flowering inflorescence incorrectly coming from the apical bud and not from the leaf axil. In fact, the plate of *S. falcatus* looks vegetatively nothing like the species. Another error in this regard shows the inflorescence coming from the rhizome in *Dendrobium wassellii*.

Common names are lavishly given to most of the species illustrated; including a few new ones (at least to me). Some of the more colourful are *Dendrobium fleckeri* (yellow moth orchid), *D. johannis* (flying acrobats), and *D. tozerensis* (cane orchid).

A number of subjective comments are made throughout the descriptions which completely baffled the reviewer. *Dendrobium adae* is said to have 'flowers often of different sexes'; *D. lichenastrum* is 'a controversial species, as close to *Bulbophyllum* as it is to *Dendrobium*' (even though the flower comes from the leaf axil and not the rhizome as in *Bulbophyllum*), and *D. bairdianum* is 'a hardy, long flowering, distinctive species'. Obviously they have never tried to cultivate it!

An amazing range extension is given to *Cryptostylis ovata*, previously endemic to South-Western Australia - it has now allegedly been recorded from the Gibraltar Range National Park in Northern New South Wales. It is quite probable the plant in question will prove to be a vigorous form of *C. subulata*.

The range extension for *Dendrobium striolatum* is also quite interesting.

The authors acknowledge the assistance of a number of well known authorities on orchids. However, I am certain they did not have the opportunity to read the manuscript before publication. An example - Steve Clemesha, one of Australia's experts on *Dendrobium speciosum*, is acknowledged, despite the fact that only two varieties of this species are mentioned. Steve was responsible for the epic review of *Dendrobium speciosum* into six varieties, published in *The Orchadian* in 1981-82. The old generalisation of *D. speciosum* var. *speciosum* only occurring on rocks and *D. speciosum* var. *hillii* only on trees again is incorrectly perpetuated.

At $34.95, it is rather expensive for a field guide. This book is really for the fanatic who collects every publication on our native orchids. Despite being twice the price, 'Native Orchids of Australia' by David L. Jones, would be a far better investment.

David Banks

GERMINATION REQUIREMENTS FOR SEEDS OF AUSTRALIAN NATIVE ORCHIDS

Naoki Kawaguchi
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Sterilisation with 0.1% sodium hypochlorite for 10 minutes followed by germination and growth on Kano medium gave the best results with seeds of *Dendrobium speciosum* var. *speciosum*, *D. discolor*, *D. kingianum* and *D. linguiforme*. Poor germination resulted when seeds of *Calochilus robertsonii*, *Cymbidium madidum*, *C. suave*, *Oberonia titania*, *Plectorrhiza tridentata* and *Phaius tankervilleae* were sterilised with 0.1% sodium hypochlorite for 5-120 minutes.

INTRODUCTION

Although Australia has a great variety of native orchids, few of the 94 genera and 570 species are widely cultivated outside Australia. One of the reasons for this may be the difficulty of germinating the seeds.

Generally, orchid seeds are minute and undifferentiated. Most of the them contain an "embryo" composed of eight to 100 cells with the endosperm undeveloped or completely lacking. Germination is irregular and slow, so it is difficult to obtain uniform seedlings. This is particularly so in the species, and presents a serious obstacle to their successful cultivation. In spite of these problems, seeds of many Australian native orchids have been germinated under both symbiotic and asymbiotic conditions (McIntyre *et al.* 1972, Warcup 1973, Clements 1981). Most experimenters have used Knudson C medium, and very little attention has been paid to the possible value of alternative media.

This paper describes a study of the methods which may be employed for the effective germination of the seeds of ten Australian orchid species which may have horticultural value.

MATERIALS AND METHODS

Seed Collection and Sterilisation

Mr G. Black and Mr J. Roberts kindly provided seeds of the following species, collected from plants in cultivation at Mudgeeraba in South-east Queensland: *Calochilus robertsonii* Benth., *Cymbidium madidum* Lindley, *Cymbidium suave* R. Br., *Dendrobium discolor* Lindley var. *discolor*, *Dendrobium kingianum* Bidw. ex Lindley, *Dendrobium linguiforme* Sw. var. *linguiforme*, *Dendrobium speciosum* Smith var. *speciosum*, *Oberonia titania* Lindley, *Phaius tankervilleae* (Banks ex L'Herit.) Blume, and *Plectorrhiza tridentata* (Lindley) Dockr.

The seeds were collected either at maturity or while still in "green pods". The dry seeds from the mature pods were placed in paper envelopes, and used within one week of harvest. The green pods, which had almost matured but had not yet split, were stored in a dry place at room temperature until mature, and then used immediately. In all cases, the pods were carefully selected in order to obtain seed with the highest degree of viability, as the state of the pods at maturity varied greatly from one species to another.

The methods used for sterilisation varied amongst the species. For *D. speciosum*, the seeds were surface-sterilised in solutions of 0.1%, 0.5%, or 1% sodium hypochlorite, or in 50%, 75%, or 99% ethanol for 5, 10, 30, 60, or 120 minutes. Seeds of the other species were sterilised only in 0.1% sodium hypochlorite for 5, 10, 30, 60, or 120 minutes. After sterilising, all operations were carried out under aseptic conditions; the seeds were washed in sterile water and transferred to the nutrient media with a wire loop 3 mm in diameter.

Culture Media

The following culture media were used: Kano (Table 1) (Hyponex; Kano 1965), B5, Knudson C, Murashige and Skoog, Nitsch and Nitsch, and White (George and Sherrington 1984).

Table 1. Kano (Hyponex) medium (Kano 1965).

Component	Amount per litre of culture medium
Hyponex*	3 g
Sucrose	35 g
Peptone	2 g
Agar	10 g
Water	1000 ml

*Hyponex (Hydroponic Chemical Co. Inc., Copley, Ohio, USA.) has an N:P:K ratio of 6.5:6.0:19.0, made up from ammonium sulphate (1% N), sodium nitrate and ammonium nitrate (totaling 5% N), calcium hydrogen orthophosphate (4.5% P), and potassium chloride and potassium sulphate (totaling 19% K).

Each medium contained 1% agar, and the pH was adjusted to 5.6. Ten ml of medium was placed in each 7.5 x 2.5 mm culture tube, and sterilised at 121 °C for 30 minutes.

Culture

After sowing, the tubes were placed on glass shelves under constant fluorescent light at 25 °C. Each treatment was replicated five times. After 30 days, and again after 100 days, the percentage germination in each tube was estimated (to the nearest 10%), and the mean height of the seedlings measured. In the case of *D. speciosum*, only the 30-day measurements were taken. Mean heights were recorded in eight classes from 0 to 90 mm.

RESULTS

D. speciosum

Sterilisation with sodium hypochlorite at concentrations of 0.1% and 0.5% for periods from 5 minutes to 30 minutes had little effect on germination of seeds of *D. speciosum* on any media (Table 2). However, when 1% sodium hypochlorite was used, good germination was obtained only when the sterilisation period was 30 minutes or less. By comparison, ethanol almost invariably inhibited germination, only the lowest concentration for the shortest time giving a satisfactory result. All sterilisation treatments were effective in preventing microbial contamination, and the relatively rare contaminations were due to deficiencies in technique.

Sterilisation treatment had little or no effect on seedling growth when sodium hypochlorite was used, but ethanol had an inhibitory effect which was similar to that on germination (Table 3). Seedling growth was generally best on Kano medium after sterilisation in sodium hypochlorite. As there does not seem to be any need for long periods of sterilisation, the use of 1% sodium hypochlorite for 10 minutes is recommended for sterilisation of *D. speciosum* seeds.

Other *Dendrobium* Species

In order to minimise the risk of damage to the seeds, only a low concentration of sodium hypochlorite (0.1%) was used. The three *Dendrobium* species varied in their sensitivity to the treatment (Table 4). Good germination of *D. linguiforme* was obtained only when relatively short periods of sterilisation lasting 5 or 10 minutes were used. On the other hand, *D. kingianum* gave good germination when sterilised for up to 30 minutes. The data for *D. discolor* are incomplete because of accidental contamination of

Table 2. Effects of seed sterilisation with sodium hypochlorite or ethanol on germination percentage of seeds of *Dendrobium speciosum* var. *speciosum* grown for 30 days on six culture media.

Sterilising agent	Length of sterilisation period (min.)														
	B 5 medium					Kano medium					Knudson C medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
0.1% sodium hypochlorite	90	90	70	80	90	95	95	80	co*	80	90	90	80	80	90
0.5% sodium hypochlorite	90	80	80	90	80	95	95	95	95	95	90	90	70	50	50
1.0% sodium hypochlorite	90	90	90	50	5	90	90	95	90	5	90	90	90	60	1
50% ethanol	90	90	50	10	0	co	80	co	40	20	90	70	60	60	30
75% ethanol	90	90	60	60	60	80	70	70	40	40	80	50	50	40	40
99% ethanol	40	5	0	0	0	0	0	0	0	0	0	0	0	0	0

	Murashige & Skoog medium					Nitsch & Nitsch medium					White medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
0.1% sodium hypochlorite	90	90	80	80	90	80	80	80	80	80	90	90	80	70	90
0.5% sodium hypochlorite	co	co	co	co	co	co	co	co	co	co	co	co	50	10	80
1.0% sodium hypochlorite	90	90	90	40	0	co	co	co	co	co	70	90	70	50	1
50% ethanol	90	80	50	40	20	90	90	50	0	0	90	90	60	0	0
75% ethanol	70	50	50	40	40	60	60	60	40	50	80	60	60	40	30
99% ethanol	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0

*co: contamination

the culture tubes. However, this species showed similar responses to those of *D. kingianum*.

As was the case with *D. speciosum*, Kano medium was clearly the best growth medium for all three species (Table 5). Even after 100 days, growth on the other media was considerably less than that on Kano at 30 days.

Other Genera

Very poor germination was obtained when the seeds of species from the other genera were sterilised with 0.1 to 1.0% sodium hypochlorite for periods ranging from 5 minutes to 120 minutes

Table 3. Effects of seed sterilisation with sodium hypochlorite or ethanol on growth* of seedlings of *Dendrobium speciosum* var. *speciosum* grown for 30 days on six culture media.

Sterilising agent	Length of sterilisation period (min.)														
	B 5 medium					Kano medium					Knudson C medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
0.1% sodium hypochlorite	5	5	5	3	3	5	7	7	co**	6	3	3	2	2	2
0.5% sodium hypochlorite	5	5	5	3	3	6	6	5	5	5	3	3	3	2	2
1.0% sodium hypochlorite	5	5	5	5	1	7	7	7	7	5	5	5	5	3	3
50% ethanol	5	5	5	3	0	co	5	co	4	3	4	5	4	1	1
75% ethanol	3	3	3	1	1	5	5	4	3	3	2	2	2	1	1
99% ethanol	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0

	Murashige & Skoog medium					Nitsch & Nitsch medium					White medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
0.1% sodium hypochlorite	4	3	2	2	2	3	3	3	2	2	2	2	2	2	1
0.5% sodium hypochlorite	co	co	co	co	co	co	co	co	co	co	2	2	2	2	1
1.0% sodium hypochlorite	6	6	5	5	5	co	co	co	co	co	3	3	3	2	1
50% ethanol	5	5	4	1	1	3	3	3	0	0	3	3	3	0	0
75% ethanol	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
99% ethanol	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0

*Growth index: 0, no germination; 1, <10 mm; 2, 10-25 mm; 3, 25-40 mm; 4, 40-50 mm; 5, 50-65 mm; 6, 65-80 mm; 7, >80 mm.

**co: contamination

Table 4. Germination percentage of seeds of *Dendrobium discolor*, *D. kingianum* and *D. linguiforme* grown for 30 days on six culture media after seed sterilisation with 0.1% sodium hypochlorite.

Species	Length of sterilisation period (min.)														
	B 5 medium					Kano medium					Knudson C medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
D. discolor	co*	co	co	co	co	20	co	co	co	co	60	60	10	30	30
D. kingianum	co	90	co	co	co	90	90	70	50	30	80	80	60	10	60
D. linguiforme	80	40	20	0	0	90	90	10	0	0	90	70	40	0	0

	Murashige & Skoog medium					Nitsch & Nitsch medium					White medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
D. discolor	20	10	50	co	80	co	co	co	co	co	co	co	co	co	co
D. kingianum	80	80	60	40	10	co	60	co	co	co	co	90	co	co	co
D. linguiforme	5	5	10	0	0	20	20	0	0	0	0	0	0	0	0

*co: contamination

Table 5. Effects of seed sterilisation with 0.1% sodium hypochlorite on growth[*] of seedlings of *Dendrobium discolor*, *D. kingianum* and *D. linguiforme* grown for 100 days on six culture media.

Species	Length of sterilisation period (min.)														
	B 5 medium					Kano medium					Knudson C medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
D. discolor	co[**]	co	co	co	co	5	co	co	co	co	3	3	2	1	1
D. kingianum	co	6	co	co	co	7	7	6	6	6	5	5	5	4	3
D. linguiforme	6	6	5	0	0	7	6	5	0	0	6	5	3	0	0
	Murashige & Skoog medium					Nitsch & Nitsch medium					White medium				
	5	10	30	60	120	5	10	30	60	120	5	10	30	60	120
D. discolor	5	4	3	co	3	co	co	co	co	co	co	co	co	co	co
D. kingianum	4	4	4	3	3	co	4	co	co	co	co	2	co	co	co
D. linguiforme	5	5	3	0	0	2	2	0	0	0	0	0	0	0	0

[*] Growth index: 0, no germination; 1, <10 mm; 2, 10-25 mm; 3, 25-40 mm; 4, 40-50 mm; 5, 50-65 mm; 6, 65-80 mm; 7, >80 mm.

[**] co: contamination

(data not presented). About 10% of the seeds of *Oberonia titania* germinated on Kano medium, but their growth was very slow.

DISCUSSION

Sterilisation in 0.1% sodium hypochlorite for 5-10 minutes, followed by growth on Kano medium, gave the best result with all *Dendrobium* species, although *D. speciosum* was able to tolerate more drastic sterilisation. Two reasons are suggested to explain the failure of the seeds of the other genera to germinate. Firstly, the seeds may have lacked viability despite the care taken in their collection. Alternatively, these genera may have special nutritional requirements which were not satisfied by the six standard media used in this study. It is possible that the terrestrial or semi-terrestrial habit of many of these species is the reason for their difficulty in germination, or they may require lower nutrient concentrations, especially lower sugar levels (Arditti 1974).

Kano medium is popular in USA and Japan because it is convenient and easy to handle. However, it does not appear to be widely known in Australia, possibly because one of its main ingredients, Hyponex (Table 1), is not readily available. Nevertheless, the superior germination and growth obtained on Kano medium suggests that orchid growers would obtain good results with species of the *Dendrobium* genus by using this or a similar medium.

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SOME LITTLE-KNOWN VICTORIAN ORCHID TAXA: PART 2

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***Thelymitra pulchella* J.D. Hook.**

The taxon previously known in Australia as *Thelymitra venosa* var. *cyanea*, *Thelymitra cyanea* and *Thelymitra X cyanea* has recently been recognised as being con-specific with the New Zealand species *Thelymitra pulchella* (Clements 1989). (Editor's note: *T. venosa*, as far as is known, occurs only around Sydney; *T. cyanea* is a widespread orchid found mainly in the highlands of New South Wales, Victoria, South Australia, Tasmania, and New Zealand; *T. pulchella* is found mainly in Victoria and New Zealand.)

In Victoria, there appear to be two distinct forms of this orchid, one from sub-alpine meadows of the eastern highlands (Fig. 11), and the other from the margins of lowland swamps and grasstree plains (Fig. 12), mainly in East Gippsland. (Editor's note: Some authorities consider these forms to be con-specific, while others consider that they are distinct species.) The former have intense blue or purple flowers with prominent darker veins, while the latter are uniformly pale blue in colour. Morphologically they are very similar with some variation in the amount of toothing or lobing on the column arms, a feature also displayed by this species in New Zealand. In Tasmania, the two forms are sometimes found growing together and flowering at the same time (R. Bates pers. comm.). In Victoria, the sub-alpine plants flower mainly from late December through January, whilst those from the lowlands flower from October to November. The pale blue lowland form has been identified as an undescribed species (Beauglehole 1981, Forbes and Ross 1988) based on collections from the Croajingalong National Park. The highland form in recent years was thought to be a natural hybrid.

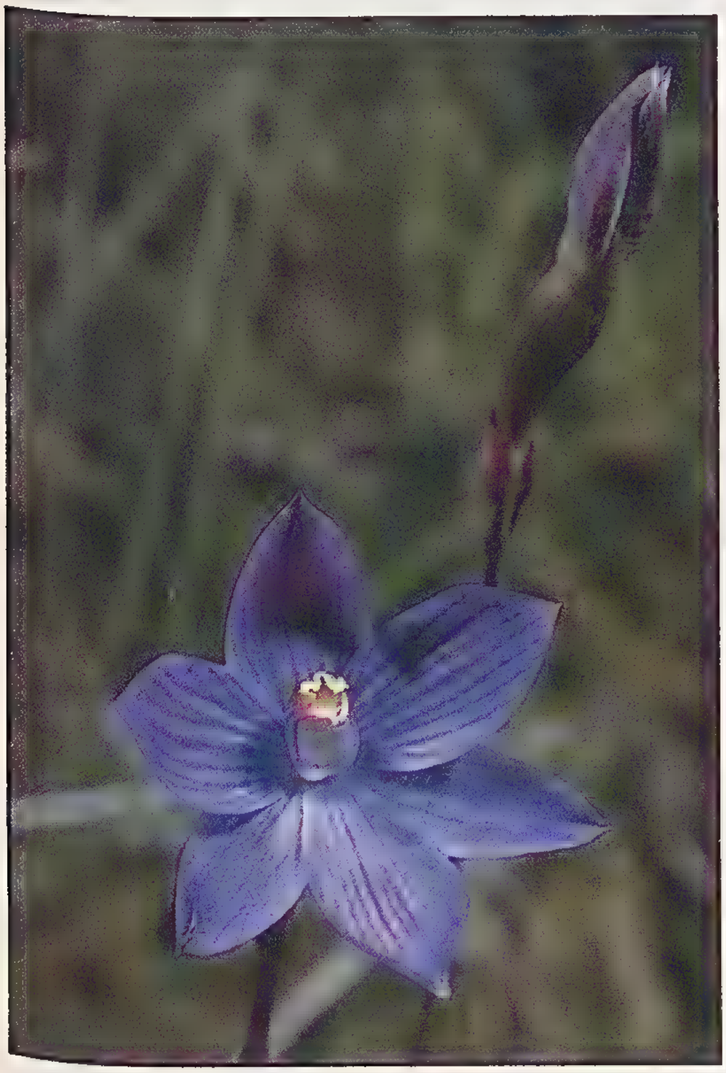

Fig. 11. *Thelymitra pulchella* J.D. Hook. highland form. Photo by Jeff Jeanes.

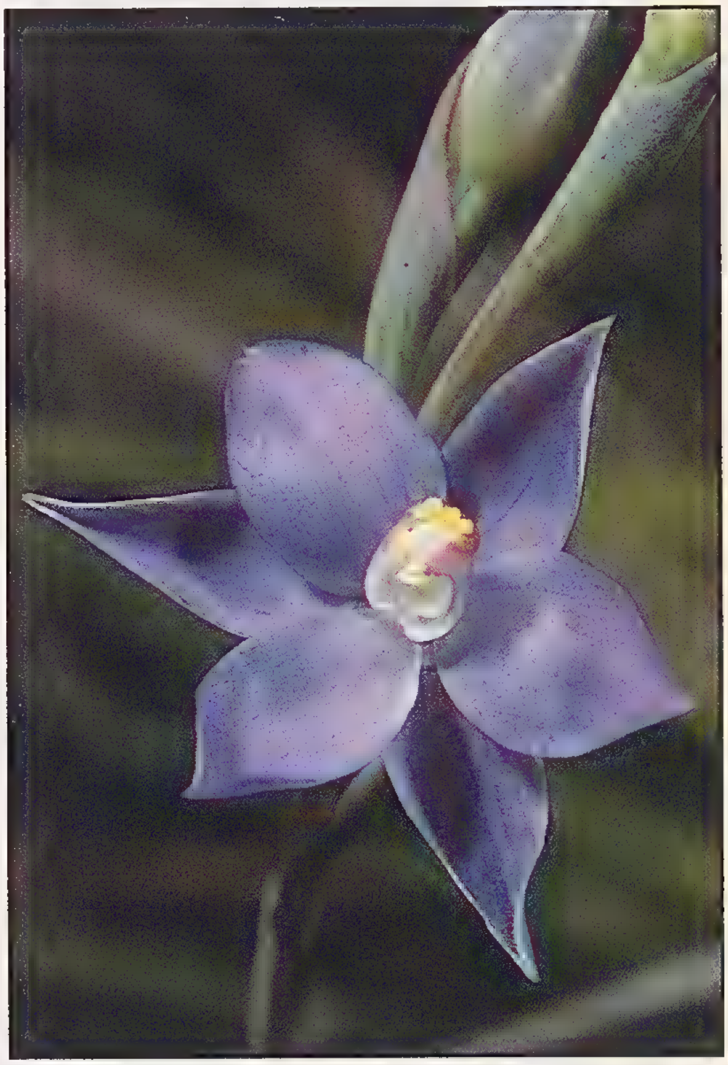

Fig. 12 *Thelymitra pulchella* J.D. Hook. lowland form. Photo by Jeff Jeanes.

Thelymitra pulchella appears to be quite rare in Victoria, but fortunately both forms occur within national parks and are probably secure at present. Over-grazing, draining of swamps and weed invasion may constitute some future threats to this most attractive Sun Orchid.

Pterostylis despectans (Nicholls) M. Clements et D. Jones

Apart from *P. woollsii*, one of the most distinctive members of the so-called 'rufa'group of the genus *Pterostylis* in Victoria is *P. despectans* (Fig. 13). This extraordinary taxon had languished, first as a variety of *P. rufa*, then as a form of *P. biseta* until very recently when its status as a legitimate species was finally recognised. It is difficult to understand why taxonomic revision has taken so long, as *P. despectans* has a number of features which easily distinguish it from all related species. Some of these features are:

1. Small stature of plants generally not exceeding 70mm in total height.
2. Small pale brown and green flowers with relatively long points on the lateral sepals.
3. Very deflexed pedicels, generally causing the tips of the lateral sepals to touch the ground.
4. Flowering period peaking in late November to early December. This is about one month later than most other members of the 'rufa' group in Victoria.

Probably the most remarkable thing about *P. despectans* is its ability to blend in with its chosen habitat. Plants tend to be the same colour as the ground and leaf litter in which they grow, and their small stature makes them extremely difficult to see. Even a search on hands and knees in an area where they are known to grow may result in a very long delay before plants are detected. This difficulty in locating plants could, at least in part, explain the apparent rarity of the species which may be more widespread than current records suggest. At the moment, it is generally regarded as being endemic to the Maryborough-Talbot area of the west central goldfields of Victoria.

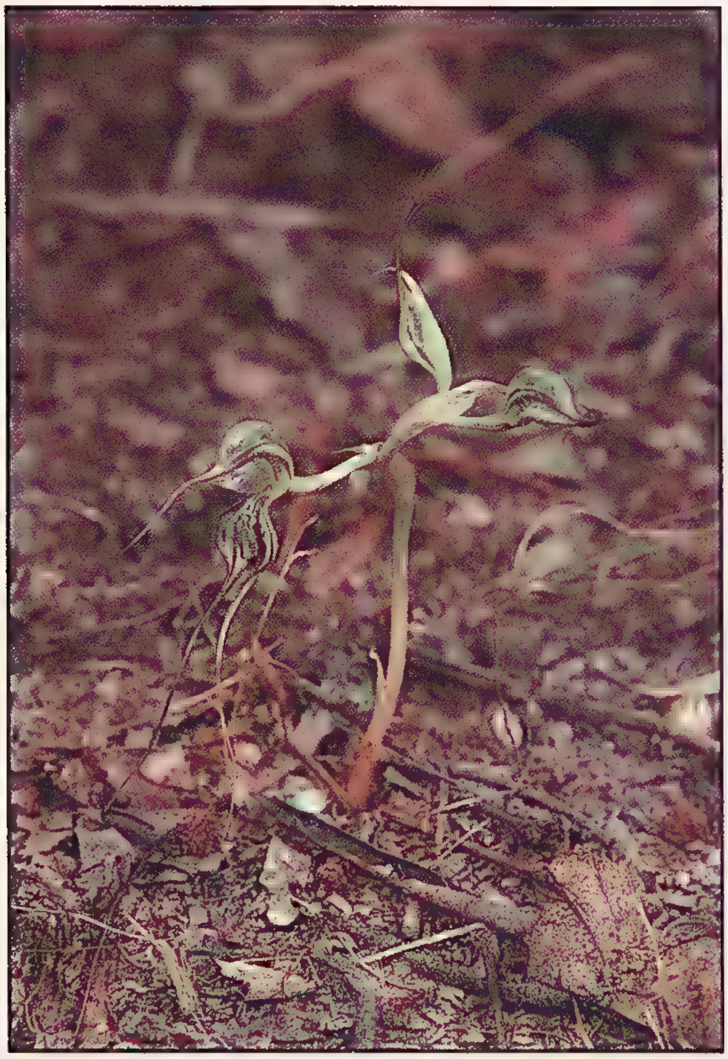

Fig. 13. *Pterostylis despectans* (Nicholls) M. Clements & D. Jones.

Photo by Jeff Jeanes.

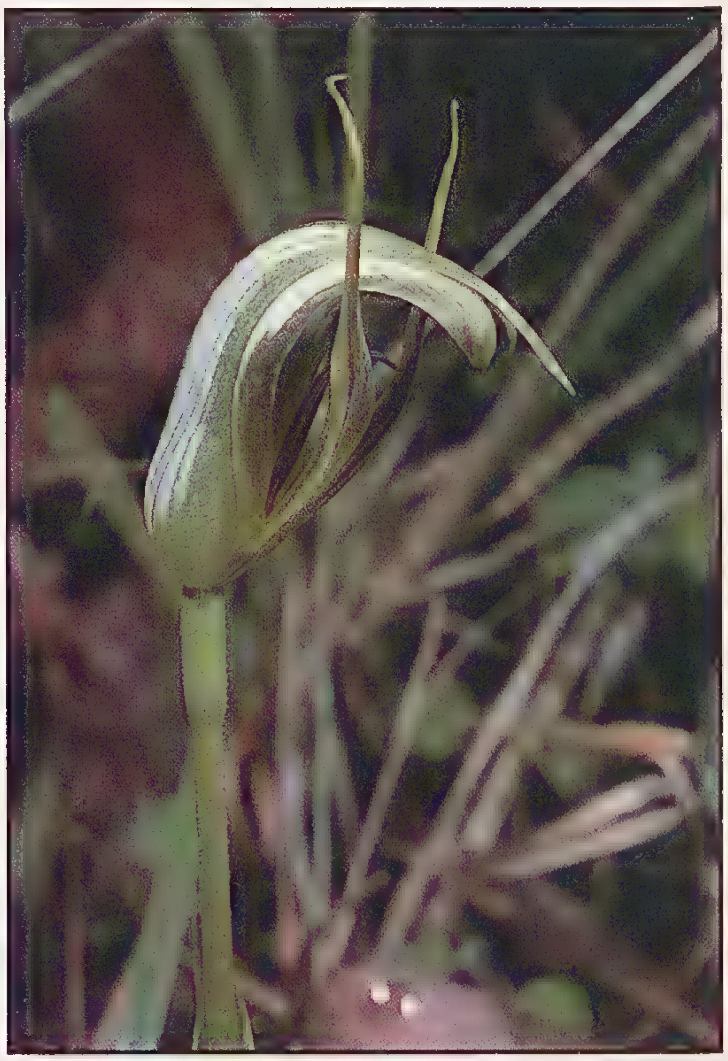

Fig. 14. *Pterostylis sp.*

Photo by Jeff Jeanes.

Pterostylis despectans is not known to occur in any biological reserves, and must be considered as severely endangered, particularly due to current gold extraction techniques employed in Victoria. It is found in open forests and woodlands dominated by Yellow Gum (*Eucalyptus leucoxylon*) and Grey Box (*E. microcarpa*), often growing in gravelly soils around exposed seams of rock or tucked away under low bushes.

Pterostylis sp.

One of the most beautiful greenhoods in Victoria is an apparently undescribed taxon form a montane water course in the Omeo district of the eastern highlands (Fig. 14). I saw this orchid for the first time in mid-November 1988 and was immediately impressed by the large greenish flower with bold red/brown markings. Others who have seen these plants have suggested that they represent a hybrid involving *P. cucullata*, but this species has not yet been seen in that part of the state. If the Omeo plants are a hybrid, their parentage is not obvious from the other *Pterostylis* species growing nearby, these being *P. foliata, P. alpina, P. nutans* and *P. furcata*. The plants indeed resemble *P. cucullata*, but there are a number of obvious differences ie. smaller stem leaves, longer sepal points, narrower flower and generally longer scape.

So far this *Pterostylis* is known from less than a dozen small colonies totalling up to one hundred plants, all within an area of about one hectare. It is found on the moist flats beside a creek at an altitude of about 800 m, growing and flowering with *P. furcata*. Tragically, the area is being steadily invaded by an exotic species of broom which, if unchecked, will eventually completely choke the whole region. Consequently, this taxon must be regarded as severely endangered and in urgent need of investigation to establish its true status, with appropriate steps taken to ensure its survival in the wild.

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A NEW NATURAL HYBRID FROM NORTH QUEENSLAND: *Dendrobium canaliculatum* x *Dendrobium carronii*

J. Bertoldo[1] and I. Leighton[2]

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In September 1989, while visiting Cape York Peninsula, we were traversing an area of *Melaleuca* flats in the vicinity of the Lockhart River Community. Not unexpectedly, we recorded several epiphytic orchids, including *D. canaliculatum* (common) (Fig. 15), *D. trilamellatum* (common) (Fig. 16), and *D. carronii* (rare) (Fig. 17). All these species were in flower. Protracted searching also revealed the natural hybrid *D. canaliculatum* x *D. trilamellatum*.

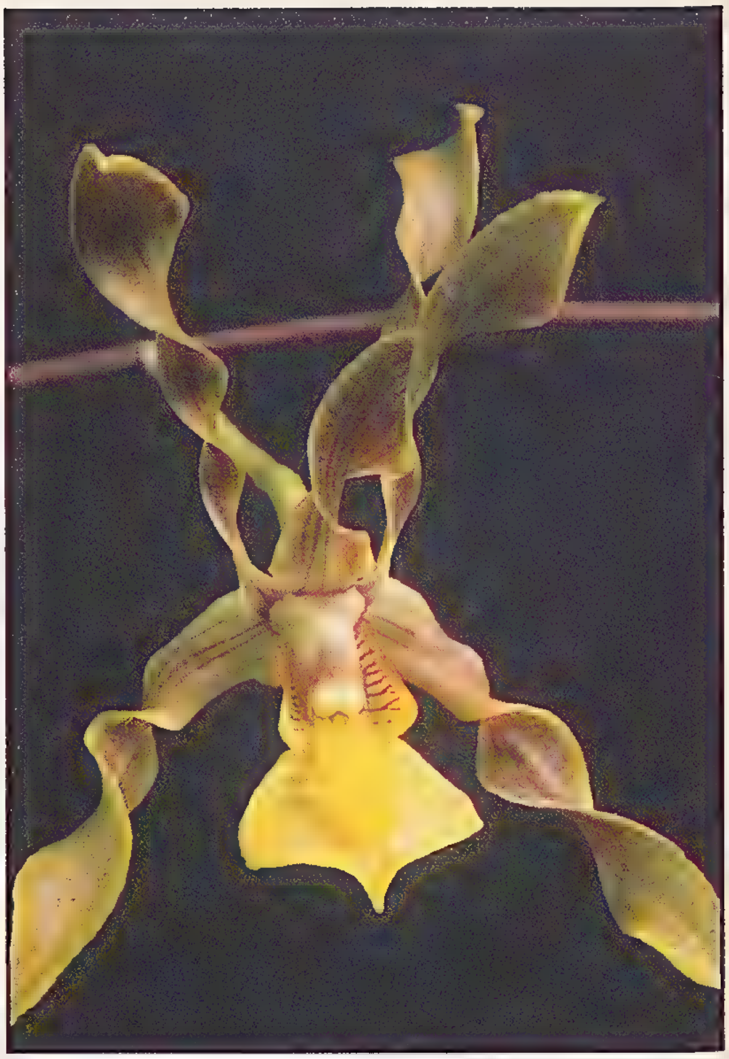
Routine examination of the *D. canaliculatum* flowers brought to light some unusual ones. Four plants were seen with these different flowers and a close inspection convinced us that the plants were natural hybrids and that the putative parents were *D. canaliculatum* and *D. carronii*.

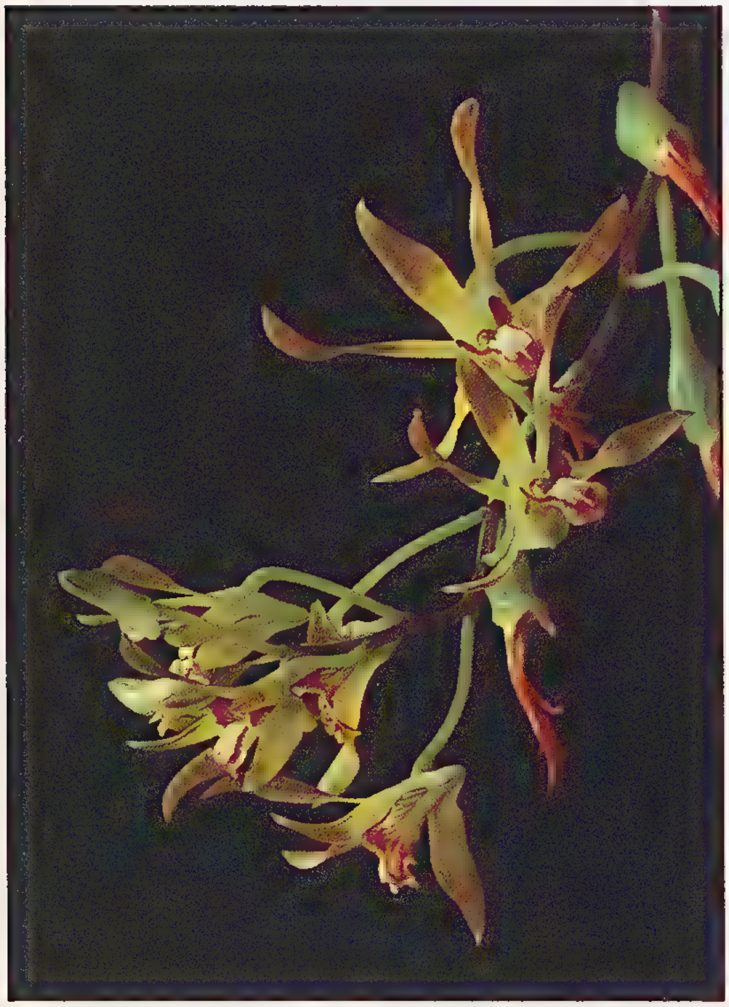
In gross appearance the plants could not be distinguished from the plants of either parent. One plant had the inflorescence subtended from the pseudobulb at near to a right angle in the manner of some plants of *D. carronii*, while the other three had the inflorescence upright. The flowers were clustered at the top of the spike and numbered twenty-five in the largest inflorescence (an upright one).

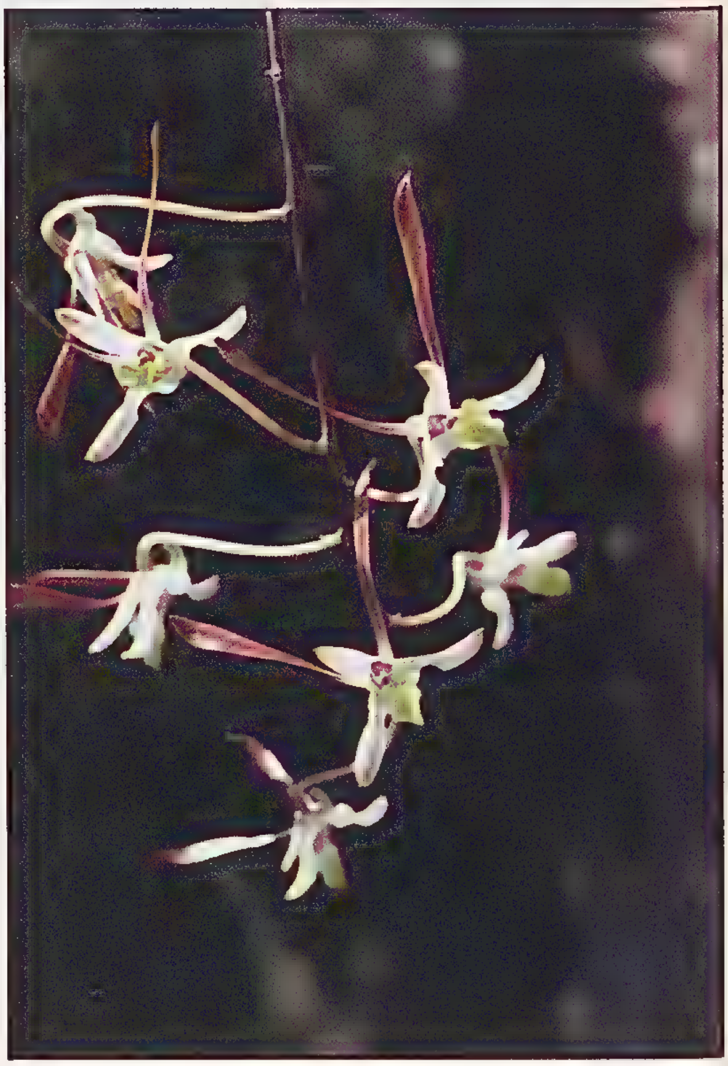
While the structure of the individual flowers exhibited some variation from inflorescence to inflorescence, all conformed to a pattern which suggested a *D. canaliculatum* flower, but with the petals of *D. carronii*. The red colour from *D. carronii* was distributed in varying intensity and arrangement.

In 1987, Richella Orchids of Honolulu registered the hybrid, *Dendrobium* Mighty Mite, as the progeny of *D. canaliculatum* and *D. carronii*. We have not seen this artificial hybrid.

A further article is proposed which will include detailed drawings and description.







Above: Fig. 15. *Dendrobium canaliculatum* R. Br. Photo by N. Grundon.

Top right: Fig 16. *Dendrobium trilamellatum* J.J. Smith. Photo by W. Upton.

Bottom right: Fig. 17. *Dendrobium carronii* Lavarack et Cribb. Photo by M. Harrison.

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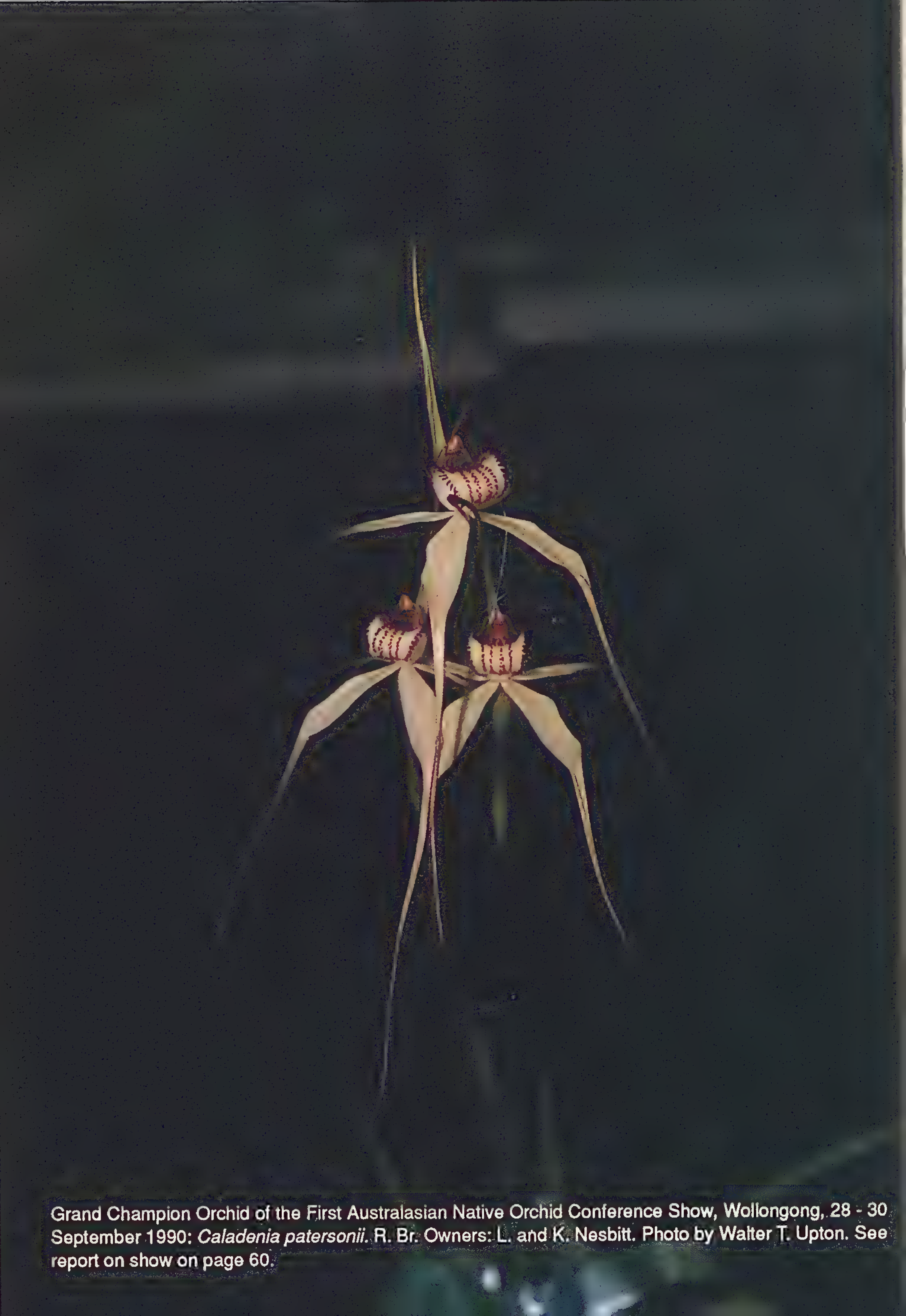

Grand Champion Orchid of the First Australasian Native Orchid Conference Show, Wollongong, 28 - 30 September 1990: *Caladenia patersonii*. R. Br. Owners: L. and K. Nesbitt. Photo by Walter T. Upton. See report on show on page 60.

The Orchadian

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EDITORIAL

Where are we going?

Over the years since its foundation in 1963, ANOS Council became, by necessity rather than by design, a mainly NSW and Sydney-based organisation, although this was not the intention of its founding members. Then about ten years ago, ANOS Council began a series of bold adventures to establish a truly national identity.

In an effort to gain greater input from its wide flung membership, ANOS Council initiated annual meetings of delegates from each ANOS Group. This move has been highly successful in expanding the image of ANOS as both a national and international organisation which, in the words of our current President, Walter Upton, "is the Guardian of the Australasian Native Orchid."

With such an ethic to guide it, it was natural therefore, that, in 1988, ANOS Council should form a Conservation Sub-committee to co-ordinate the individual efforts of its member groups in the area of conservation of our native orchid flora. This has been another highly successful move.

Inspired by members of the Wollongong and District Native Orchid Society, ANOS Council backed the undertaking of the First Australasian Native Orchid Conference and Show at Wollongong in 1990. Another bold and successful adventure.

ANOS Council is now considering submissions from two member groups to host a Second Australasian Native Orchid Conference and Show. If either of these submissions are successful, it will see this conference being held outside the Sydney metropolitan area, again emphasising the national nature of ANOS.

A browse through the early issues of The Orchadian serves to illustrate the national and international flavour of the journal which has been maintained to this day. However, the production team has been centred in Sydney until, in 1987, the current Editor and Editorial Associates accepted the challenge offered by Walter Upton and Murray Corrigan to undertake the production of the journal on a truly Australasian-wide basis. A glance at the left-hand box on this page illustrates the success of that initiative.

The first year of operation of ANOS saw the formation of two groups. Six groups had been formed by the end of the tenth year, fourteen by the end of the twentieth year, and, as of January 1990, there were eighteen ANOS Groups or Associated Societies. Since January 1990, four new groups have been formed, one in NSW, ANOS Macarthur & District Group, and three in Queensland, ANOS Mackay & District Group, ANOS Wide Bay Group, and KABI (South-east Qld) ANOS Group.

Where are we going? **We're on the move.** Membership is increasing. Ninety-seven new members have joined between July 1990 and February 1991, while twenty people have taken out group membership. **Yes mate, we're on the move nationally and internationally!**

Noel J Grundon

THE GENUS *DENDROBIUM* IN AUSTRALIA, ITS SPECIES AND HYBRIDS

Walter T. Upton
P O Box 215, West Gosford NSW 2250

[Editor's note: This paper was presented at the First Australasian Native Orchid Conference, 28-30 September, 1990, The University of Wollongong, Wollongong, NSW. It is published here with the permission of the author and the Council of ANOS Inc.]

Of the thousand or so species of the genus *Dendrobium* throughout its distribution only 55 species are to be found in Australia. Of these at least three quarters are of horticultural value and the balance are small but very desirable and interesting.

Schlechter divided the genus *Dendrobium* into four subgenera and the subgenera into forty one sections. In Australia three of the subgenera and fourteen of the sections are represented; a most diverse lot from any point of view, whether it be size, shape or colour.

The Australian members of the genus are confined to a narrow belt along the east coast, from Tasmania to the tip of Cape York Peninsula, and to a narrow strip along the extreme north coast of the Northern Territory and Western Australia. Within this area are also found the main forests.

Australian topography is unique. The continent was formed in early geological times and has not been subject to recent forces such as mountain-building upheavals, with the result that the land was worn smooth in comparison to other continents. Only five per cent of the land is over 615m high. It is one of the world's flattest continents.

On the east coast there is a narrow coastal strip varying from 1.5 to 3.5km wide in part of southern NSW, to about 160km wide in southern Queensland. To the west of this coastal strip is the Great Dividing Range, which averages around 900m high. This range is of sufficient height to influence the rainfall and, as Australia lies within the south-east trade winds, moisture-laden air is brought in from the Pacific Ocean. The warm East Australia Current coming from the tropics flows southward along the east coast and further stimulates rainfall by increasing the water vapour in the atmosphere. The climatic conditions on the east coast are ideal for the genus *Dendrobium*. West of the Great Dividing Range, rainfall is lower and native *Dendrobium* orchids are rarely found.

The northern coastal strip of the continent, where *Dendrobium* species also occur, is an area of summer monsoonal rains. Heavy rains occur during three or four months and the rest of the year is hot and dry.

CULTURE

For cultural purposes the species can be divided into three types:

1. Tropical (North Queensland and Northern Territory)

D. affine, D. antennatum, D. baileyi, D. bifalce, D. bigibbum, D. canaliculatum, D. cancroides, D. car-

Dendrobium Dainty Gem is a hybrid combining the best qualities from the species *D. affine, D. canaliculatum, D. jonesii, D. tetragonum,* and *D. kingianum* (twice).
Photo. and hybridiser: W. Upton

ronii, D. discolor, D. insigne, D. johannis, D. johnsoniae, D. lobbii, D. luteocilium, D. malbrownii, D. mirbelianum, D. nindii, D. smillieae, D. stuartii, D. X superbiens, D. trilamellatum, D. tozerensis.

Minimum winter temperature 12°C, high light intensity and heavy watering while in active growth.

2. Sub-tropical (highlands of North Queensland)

D. adae, D. agrostophyllum, D. carrii, D. fellowsii, D. fleckeri, D. jonesii, D. lichenastrum, D. monophyllum, D. prenticei, D. racemosum, D. rigidum, D. toressae, D. wassellii.

Minimum winter temperature 6°C, reasonable high light intensity and heavy watering when in active growth.

3. Temperate to Cool Temperate (South Queensland to Tasmania)

D. aemulum, D. bowmanii, D. calamiforme, D. cucumerinum, D. X delicatum, D. fairfaxii, D. dolichophyllum, D. falcorostrum, D. X foederatum, D. X gracillimum, D. X grimesii, D. kingianum, D. linguiforme, D. macropus, D. monophyllum (from southern end of distribution), *D. moorei, D. mortii, D. pugioniforme, D. schneiderae, D. schoeninum, D. speciosum, D. striolatum, D. X suffusum, D. teretifolium, D. tetragonum.*

Minimum winter temperature 2°C, bright light and heavy watering when in growth. The north Queensland forms of *D. speciosum* and *D. tetragonum* do better with a little bit of warmth in mid-winter.

There are basically four horticultural stages:

1. Growth period (late winter to early autumn)

Develop plant to ensure good sturdy growth. Give plenty of light, moisture, fresh air and moderately high temperatures.

2. Maturation. (autumn)

Mature plant by increasing light and reducing moisture.

3. Rest period for spring to summer flowering species (late autumn, winter) withhold water; slight shrivelling of pseudobulbous stems beneficial.

Rest period for autumn to winter flowering species is immediately after flowering so withhold water and give a decided rest. Hang up in top of glasshouse. Repot in spring. If plants are kept moist and warm during autumn and winter this will prevent the maturing of the pseudobulbous stems and new plants (aerial growths) will be encouraged instead of flowers.

4. Flowering period

For spring to summer flowering species start feeding and watering gradually. Repot after flowering.

For autumn to winter flowering species water sparingly but not on flowers, give plenty of light. They respond well to a rise in temperature in early spring from say 16°C to 26°C; this brings the plants into early growth and helps ensure that they mature by early autumn and are ready for flowering.

HYBRIDS

Hybridising within Australian members of the genus *Dendrobium* is gathering momentum at a great rate. In 1960, only one or two Australian hybridists were producing these hybrids, now numerous commercial and hobby hybridists are involved.

Only 17 hybrids had been made up to 1960 and the big majority of these were made using tropical dendrobiums by hybridists from other countries. By 1980, the number of native *Dendrobium* hybrids had increased to 83. In 1985, the number had increased to just over 200

Dendrobium Goldilocks is a superb example of the hybridist's art using the species *D. macropus, D. tetragonum, D. jonesii,* and *D. fleckeri (twice).*
Photo. and hybridiser: W. Upton

hybrids, and in the last five years this figure has doubled. As at March 1990, well over 400 hybrids using only Australian native dendrobiums have been made.

Of the 55 species of *Dendrobium* in Australia, 40 have been registered in hybridising, but only 10 of these to any great extent. The most used species in order of prominence are *D. kingianum, D. tetragonum, D. speciosum, D. falcorostrum, D. fleckeri, D. macropus, D. jonesii, D. bigibbum, D. discolor* and *D. canaliculatum.* You will notice that the first seven are all within the *Dendrobium* section *Dendrocoryne* and are also the most popular and commonly grown by enthusiasts, which also accounts for their progeny being in such great demand. Two hundred and forty of the 400 hybrids have one of these seven species in their background.

One may pose the question - Why limit oneself to hybridising within the Australian members of the genus when there are over 100 species available throughout its distribution? The reasons are numerous; perhaps the main one is the great demand for this kind of hybrid by the many native orchid growers in Australia. There are a great number of native orchid societies and clubs, most of whom are a Group of, or affiliated with, The Australasian Native Orchid Society. Another reason is that all orchid shows in Australia have at least one class for "Australian Native Orchid Hybrids", some have numerous native orchid hybrid classes. Maybe the greatest reason of all is the apparent unique character of these hybrids and it is desirable to keep these characteristics free from outside influences. The majority of the species are cool and a few cold growing. They are mostly very florific and some make up easily into large compact plants carrying thousands of blooms.

As stated previously the majority of the hybrids made to date have been within the *Dendrobium* section *Dendrocoryne*. All of the species in this section have been used by the hybridist, mainly I believe, because they are all cool growing, and extremely popular with the enthusiast. My main objective in this section is to produce plants that are compact and very florific and have upright racemes.

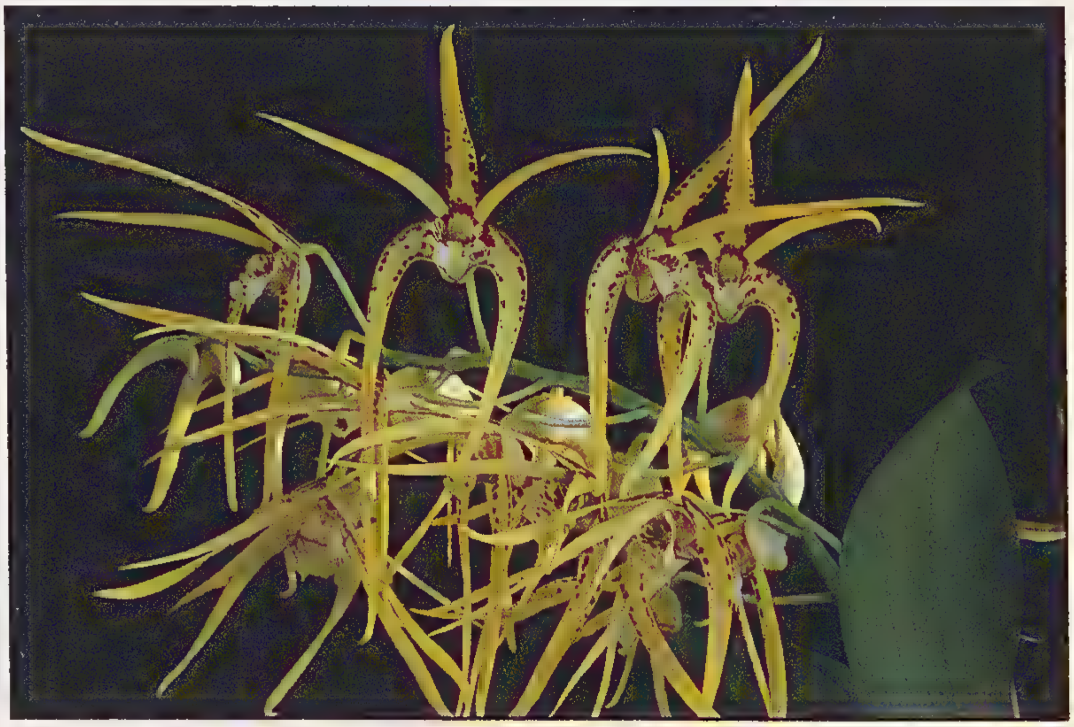
Although it is still too early to come to definite conclusions it would seem that three basic flower shapes are appearing. In a paper I gave at the Eighth Australian Conference in Townsville in 1983 I call these shapes:

1. The *D. kingianum* shape.
2. The *D. tetragonum* shape.
3. The *D. falcorostrum*/*D. speciosum* shape.

Now over six years later I see no reason to change this; if anything the situation has been confirmed. (Editor's note: See illustrations on page 96.)

If we look to the future it would appear that within the section *Dendrocoryne*, the shape No. 3 type flower will become the dominant one, but we should be able to keep the delightful shapes of *D. kingianum* and *D. tetragonum* by wise crossing to these species.

The main *Dendrocoryne* hybrid flower of the not-too-distant future will be a well filled-in large shape No. 3 type flower with a solid upright raceme of 10 or more flowers in colours of white, cream, yellow, apricot, red and purple or combinations of these colours, some heavily marked with suffusions or red/purple spotting.



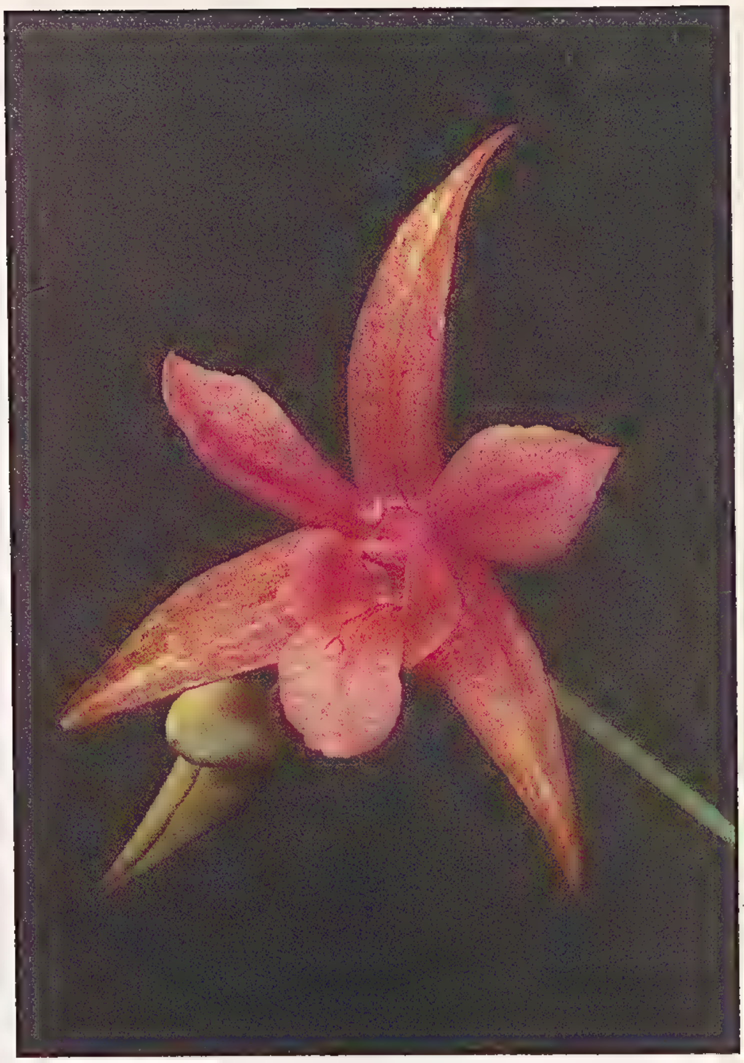
Dendrobium Ira's Star is a simple hybrid made from only three species, *D. speciosum, D. falcorostrum,* and *D. tetragonum.*
Photo: W. Upton

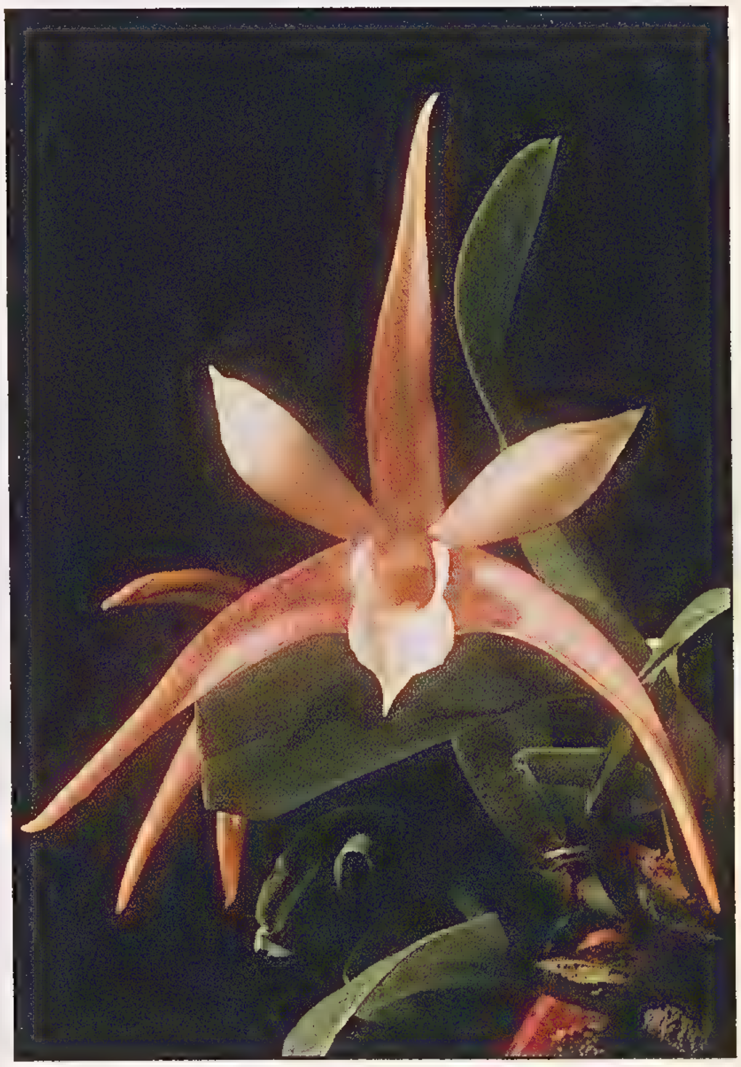
Unfortunately we are having to go outside this section for the all-important characteristic of length of time the flowers last. Within the subgenus *Athecebium* we are using *D. monophyllum.* This is achieving much longer lasting flowers but is reducing flower size, but to compensate this we are getting more flowers per raceme. Initially this is giving us more of the No. 1 shape flowers, but I think this is a good thing.

Outside of this subgenus we are using *D. bigibbum, D. affine, D. canaliculatum, D. trilamellatum, D. agrostophyllum* etc., in the subgenus *Dendrobium.* This initially gave us a certain number of warm growing hybrids, but we are breeding the warm growing factor out as we want cool growing, long lasting hybrids. We need very selective breeding to do this.

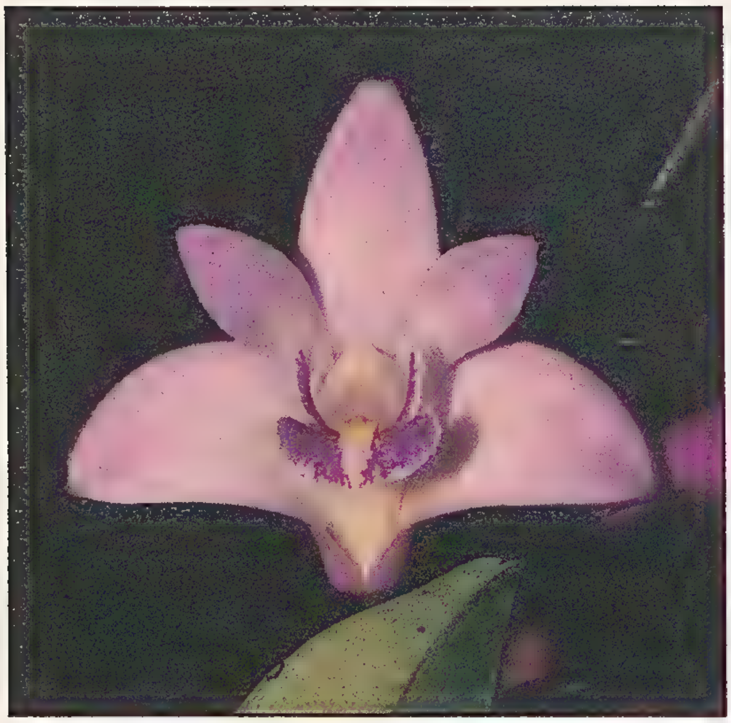
Becoming increasingly popular are hybrids between the subgenera *Athecebium* and *Dendrobium*: cool growing dendrobiums with the tropical *D. bigibbum, D. affine, D. canaliculatum* etc. The resultant progeny are mostly cool growing, particularly in the second generation hybrids such as *D.* Elegant Heart (*D.* Peewee x *D. speciosum*), *D.* Rosella (*D.* Peewee x *D. tetragonum*), *D.* Brolga (*D.* Peewee x *D.* Hilda Poxon), *D.* Lorikeet (*D.* Peewee x *D.* Ellen), *D.* Cockatoo (*D.* Peewee x *D.* Colin), *D.* Parakeet (*D.* Peewee x *D. monophyllum*). I flower all of these in a shadehouse in the Sydney area. I consider this type of hybridising has a great future as it is improving many factors in both plant and flower form as well as ease of culture. *D. bigibbum* has shown its dominance in colour, while *D. speciosum* and *D. canaliculatum* have generally improved the number of flowers on the raceme.

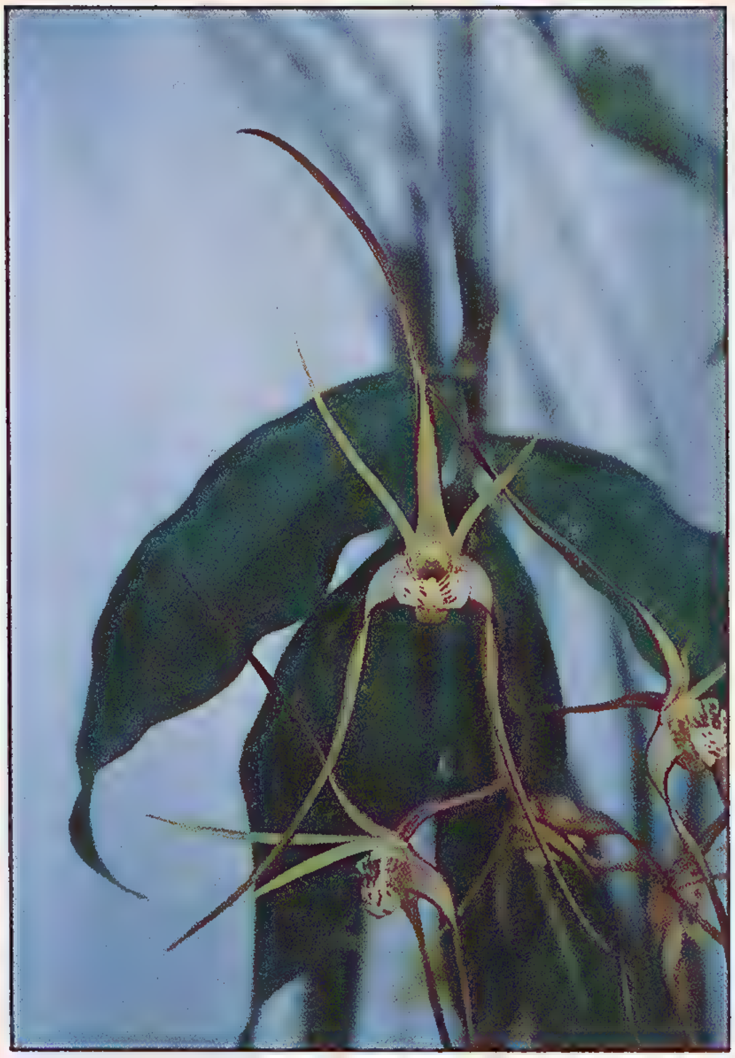
This year I have flowered for the first time a very small seedling of *D.* Peewee X *D.* Ira's Star, eighteen months from the flask, pseudobulbous stems 25mm high with a raceme of three flowers each 70mm long, cream to yellowish with pink flush sepals and a white lip and petals. This shows great promise.





Examples of the use of *Dendrobium* Peewee in breeding Australian native hybrids.
Top: *Dendrobium* Parakeet (*D.* Peewee x *D. monophyllum.*
Bottom: *Dendrobium* Elegant Lace (*D.* Peewee x *D.* Ira's Star).
Photo. and hybridiser: W. Upton.



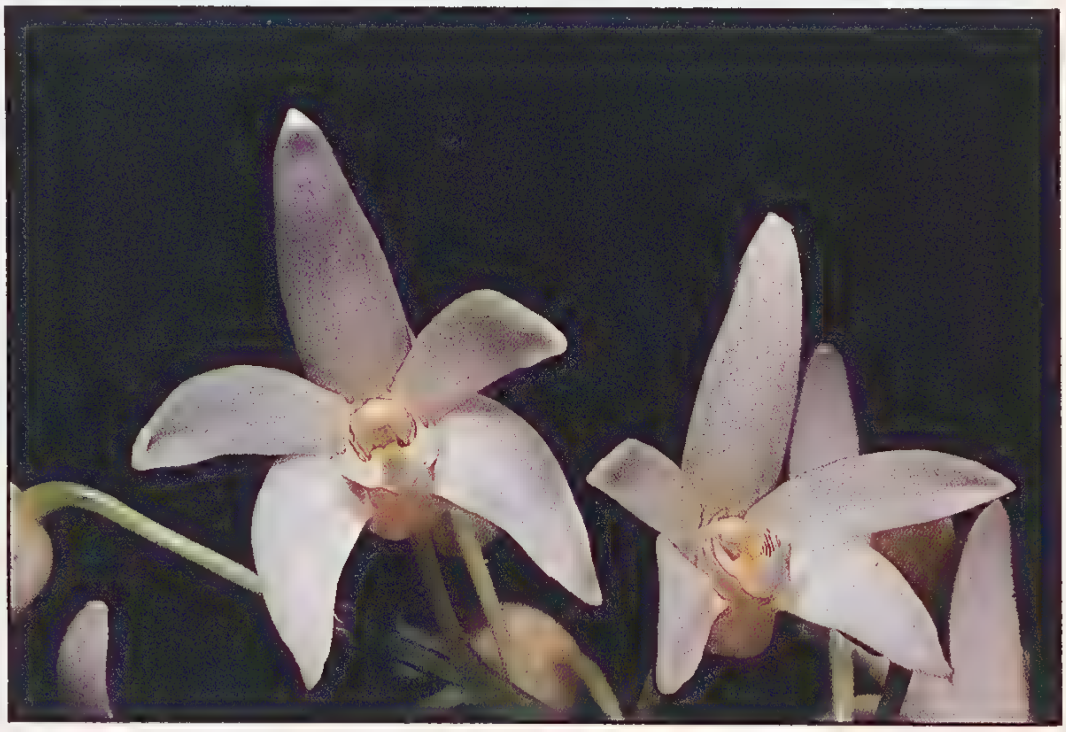


A hybridist's life is an exciting one, always something new in the pipeline, but it does not just happen, lots of planning and forethought are essential to ensure success.

The future of hybridising in Australia using only indigenous species and their progeny holds a lot of promise. At present it is in the creative stage and it will be another ten years, at least, before any regular advances of a high standard can be seen. There have already been a number of breakthroughs, including new colours, larger flowers, better shaped flowers, cool-growing hybrids using part tropical species, and compact growing plants with upright racemes, but these are isolated cases; only time will judge the real progress.

The potential of the Australian native *Dendrobium* hybrids is great, and we have the material to work with. It is necessary to bring all the good characteristics together so that we will achieve a desirable hybrid of outstanding excellence.

Examples of the three basic flower shapes appearing in Australian native hybrids as suggested by Walter Upton:
Left: *Dendrobium kingianum.* Bidw. ex Lindley
Above: *Dendrobium tetragonum.* Cunn.
Below: *Dendrobium falcorostrum.* Fitzg.
Photos: Noel J. Grundon.



WAY BACK OF THE BUSHHOUSE: A PERSONAL VIEW OF THE BEGINNING OF ANOS

Ronald Kerr
260 Geoffrey Road, Chittaway Point, NSW 2259.

Early in 1963 - I forget the exact date - I had a letter from Bill Murdoch of Coal Point, near Newcastle. Bill's reputation as a native grower had led me to call and see him on one occasion. The letter was an invitation to help form a native orchid society. I was more than willing.

An Introduction to Orchids

I had started growing orchids soon after my discharge from the army, inspired by my mother-in-law's avid interest in cymbidiums and native orchids. Rene Mahony lived most of her life on the Nambucca River. Knowing her interest in orchids, friends frequently dropped in with pieces of bush orchids until she had an extensive collection.

On holidays north I met many of her friends with similar collections. Len Archer of Coffs Harbour was one who impressed me with his carefully grown specimen plants. Len grew everything well, including some of the best specimen *Sarcochilus* I have seen. He knew many owners of properties with jungle gullies rich in orchids, and soon I was joining him on bush forays.

That was the time of the great cymbidium boom and prices verged on those of the Dutch tulip boom of two centuries ago. So I concentrated on natives, then the Cinderella orchids. I liked 'em better anyway.

Going Native

I had a reasonable native collection when the Berowra Orchid Society was formed. It had about seventeen members when I joined, none of whom had much of a collection, except that Laurie Svenson and Allen Rushton and myself were strong on natives.

In 1962 the three of us were discussing the coming Spring Show of the Orchid Society of NSW. Laurie lamented that we could not find enough plants among members to enter the Affiliated Societies' Display Section.

"But we have", I countered, "if we put on a display of natives". So it was agreed. I had written an article for the *Australian Orchid Review* as publicity for the coming Berowra Show and titled it *Berowra goes Native*, so we named our display the same, and built it around a bark gunyah.

To that time the Orchid Society of New South Wales had one class for natives at Winter and Spring Shows. Further, the society displays were judged on the range of genera as well as quality. We knew we could only come last on points, but perhaps we might create a little interest in native orchids.

It proved to be more than just a little interest. The judges awarded a special prize, and the display became the talking point of the show.

Obviously there was a latent interest in natives waiting to break out. Emboldened I wrote to the OSNSW Management Committee suggesting that for the next Spring Show at the Town Hall the stage area be used for natives, and to attract support, prize money of 200 pounds be offered over several classes.

I was invited to a committee meeting, and there the proposal was accepted unanimously. Treasurer John Nicoll checked my suggested schedule and decreed that maybe the society could manage 160 pounds in prize money. That was 50 or 60 times more than any previous amount offered for native prizes.

Over eight months I kept up a barrage of letters to metropolitan societies, and visited many to reinforce the message. I remember the president of one society writing to tell me that there were not enough native orchid growers in Sydney or plants in cultivation to justify all that prize money. It was a lot of money in those days.

Frank Slattery was President of OSNSW in 1963 and he showed his belief in the venture in every way. But I think the committee were amazed to see the stage from the great organ down filled with native orchids. Native growers had been ready for the occasion. I remember one who brought in a *Dendrobium speciosum* and needed three friends to help him carry it from his vehicle to the stage.

The only hybrids were natural ones. Reg Leaney had a raft of *D.* X *kestevenii*, 1.2 m x 0.6 m in size, and just covered in flowers. He had been with the party who found it on Mt. Alum, and had grown the specimen size plant from one small piece (Editor's note: *The Orchadian* subscribes to the view that *D.* X *kestevenii* is included in the taxon *D.* X *delicatum.*)

That was the year of the Fourth World Orchid Conference in Singapore and many Americans called at the Sydney Festival *en route.* Many remarked that their first impression on entering the hall was the mass of natives on the stage.

ANOS at Last

Earlier that year the first meeting of the *pro tempore* committee to form ANOS took place at my home at Hornsby Heights, mainly because it was the most convenient point in Sydney for Bill Murdoch.

The inaugural meeting of ANOS took place in the YWCA Hall, Liverpool Street, Sydney, on 6th July 1963. Over 80 members were present.

Sir John Hall Best graciously agreed to be patron. Sir John had recently instigated the formation of the Australian Orchid Council which united the States, and had become the first President of the Council.

Bill Murdoch was an automatic choice for first ANOS President, with Eric Gordon and Jim Scott as Vice-Presidents. Wal Upton was confirmed as Honorary Secretary. He had maintained a massive correspondence in the organising stages. Steve Clemesha became Assistant Secretary, and John Soiland became Treasurer. Bob Curtis and myself were committee members. Murray Corrigan took on the arduous job of Editor.

Murray did a mighty job as Editor. The first issue of *The Orchadian* appeared in 1963. The name was a brainchild of Eric's. I disagreed with the format. The early issues were made up of duplicated sheets and thus did not conform with the Botanical Code rule that nomenclatural matters should be published in a printed journal with a reasonable circulation. Small offset printing was then coming into its own and relatively cheap.

Cost was a determining factor. Eventually, in spite of its ephemeral format, the many important botanical articles published won acceptance from botanists for *The Orchadian.*

Murray did eventually adopt small offset, but still adhered to reproducing direct from typewritten originals. This meant a great deal of tedious work. *The Orchadian* was a major factor in building ANOS as a national body and we are all indebted to Murray.

Most editorial input was botanical. I would have liked to see more cultural articles, but we were all, I think, experimenting and not anxious to be dogmatic on culture. Murray Cox's book, "A Cultural Table of Orchidaceous Plants", then out of print but available in society libraries, was the only one with something to say on the growing of natives. Rupp's *Orchids of New South Wales* was also out of print but with luck a copy might be obtained second hand for the then horrendous sum of ten pounds. I had bought my copy at a bookshop disposal sale a few years earlier for two shillings and sixpence.

Many growers prominent today were among the founding members, including Sid Batchelor, George Colthup, Hermon Slade, Leo Cady, Bob Deane, Barry Collins, Roger Bedford, Noel Jupp, and Phyllis Nicholas.

Unfortunately other well known growers are no longer with us. Of these we can be specially grateful to John Ezzy, Dave Hardy, Reg Leaney, Len Archer, and Herb Foote. The founding membership included growers from all states and New Zealand. Alick Dockrill became the Society's first Honorary Member.

The first year of ANOS involved considerable correspondence, particularly with interstate members and moves to form new groups. The work fell on Wal Upton, and the rapid expansion of ANOS would not have been possible if Wal had not slaved long hours to keep ahead.

Bill Murdoch formed a Hunter Group (now Newcastle Group). Later he visited ANOS Groups as they were formed and this did much to cement relations with interstate growers.

ANOS owes much to Eric Gordon. Eric was a determined businessman who had come up the hard way. He was only a few years old when his father was killed during the Boer War. He was an expert marksman, and with pistol showman Lionel Bibby gave shooting exhibitions during which they shot cigars from each others lips. I first met him a year or two before when we both did a course in native plants at the Ryde School of Horticulture, which he attended to further his interest in flower photography.

Early committee meetings were held in the office of Eric's furniture factory. In the first six years of ANOS, when he was Vice-President and then President, he dictated policy. Things had to be done his way. His judgement was usually sound and on balance I think ANOS benefited.

I remember him opposing a motion of mine advocating some financial support for the starting up of new groups. Eric must have believed it necessary to conserve as much money as possible for *The Orchadian* and he opposed it. It was deferred to the next meeting for further discussion when some members supported it. At the next meeting it was placed on the bottom of the agenda and other matters dragged out so there was no time to deal with it. The following meeting, I had to send an apology, so it was pushed through and lost.

When Sydney Group was formed Bob Deane and myself supplied the hall rent for the first two meetings. Eric was right, groups had to be motivated from within.

I resigned from the ANOS Committee because I had been elected to the OSNSW Management Committee which unfortunately met on the same night. I felt I could best promote natives as Native Marshal on the OSNSW Show Committee.

When Hermon Slade stepped down as editor of the *Australian Orchid Review*, I took on the job. With Shepherd & Newman as publishers and printers I was able to exert full control over editing and production and apply my experience in advertising to making improvements in format. Over the years the ownership changed twice and the magazine became subject to consistent lateness. On two occasions I endeavoured to get the Orchid Society of NSW to buy it but the committee seemed afraid of entrepreneurial effort. On another occasion a publisher offered to buy it and pay a greatly increased editorial fee to OSNSW but again the committee turned down the opportunity to make a worthwhile amount for the benefit of orchid growers. But in spite of frustrations I enjoyed the honorary job for all but the last two of the 24 as editor and pride myself that I made quite a few thousand dollars for OSNSW, although the editorial fee paid by the publishers was always well below market rates.

In the early years I was accused of having too many articles in *AOR* on natives. The truth was that natives were the only orchids I knew a little about. Gordon Dillon, editor of the *American Orchid Society Bulletin* in letters and on his two visits to Australia gave me an interest in nomenclature. Joe Arditti, in a correspondence which became more and more informal, and also during the periods we stayed at each others' homes, gave me an insight into orchid science. Joe has the best privately owned orchid library in the world. Hermon Slade widened my vision on all genera, and also by inviting me to visit Papua New Guinea. Gerald McCraith has been an inspiration by his hard work and selfless desire to further orchid knowledge through research and promotion of hobby growing. I owe much to happy friendships with Andree Millar, Alick Dockrill, Kevin McFarlane, Jim Rentoul, Herb Foote and many others too.

It has been an absorbing and mind broadening hobby. I would have liked to be more involved in native hybridising but the pressures of frequent interstate business trips and the hours spent editing made that impossible.

In spite of a few clashes I had a great respect for Eric Gordon. When I became Native Marshal for the Sixth World Orchid Conference, Eric joined my committee, along with the late John Evans. Eric's business expertise, such as buying display material at wholesale for the Conference Show and afterwards selling it at a profit, added a few hundred dollars to the balance sheet. By putting all the resources of ANOS behind the Conference Show he helped make it a superb public relations effort for our native orchids.

Apart from the strong ANOS contribution, about three quarters of the natives were in display entries from affiliated societies and OSNSW members.

In 1969, the time of the Sixth WOC, there were few man-made native hybrids in cultivation. Wayside Nursery at Port Macquarie, run by Bill and Jean Cannons, had built up quite a stock from crosses made by the late Bas Borger. These included several remakes of *Dendrobium* Bardo Rose, *D.* Hastings, and others with such parents as *D. falcorostrum, D. jonesii, D. fleckeri,* and *D. gracilicaule.*

I entered the large display section of the World Orchid Conference Show in partnership with Jean Cannons. Jean contributed many fine examples of these crosses but there were few man-made crosses elsewhere, except perhaps in the displays by George Colthup and Wal Upton. At that time I had many splendid specimen plants. On the day before judging I had to concentrate full time on other folks' problems due to promised help not arriving. Consequently I had to spend all night on setting up my own display. Apart from the collective ANOS display there were eight large displays, seven by affiliated societies and Jean's and mine. We were pleased to come second in this stiff competition. North Shore came first with a fine exhibit designed and set up by Warwick Betteridge.

Our natives dominated the Show, helped by a fine display of West Australian terrestrials organised and set up by Herb Foote. Andree Millar contributed many Papua New Guinea species, most of them not seen before in Australia.

From that time native growing really took off due to the social structure established by ANOS, and the ever increasing supply of native hybrids. The hybridising and rising number of native nurseries exerted a powerful influence on conservation. No longer was the only source of supply the bush. Nursery bred plants from selected parents were so much more rewarding. Cheaper too. Early Wayside lists quoted advanced seedlings for as little as $1.50.

The late Ira Butler started hybridising just to encourage conservation and discourage illegal bush gathering. His impact extends today in the Ira Butler Trophies awarded annually for native hybrids.

The influential hybridisers have been Wal Upton, Sid Batchelor, Ken Russell, and Phil Spence. Many others have contributed and other important nurseries are emerging. I must mention David Banks who started at an early age and has built up a big collection of fine species for stud purposes. David's contribution has been to exploit the potential for line breeding of species. He has now bred *D. kingianum* to the third generation. Ken Russell also line breeds, and Sid Batchelor has produced greatly improved forms of *Sarcochilus ceciliae* this way.

A wide public interest in growing Australian plants has broadened to include native orchids. This has created a demand for information on growing them, consequently excellent books are now available.

Present public interest justified the splendid initiative of ANOS Council in organising the First Australasian Native Orchid Conference and Show held in late September last year. With the abundance of fine specimen plants and more than 600 registered hybrids, it was the flower show of the decade.

Our native orchids have moved from way back of the bushhouse. They are now on the front bench.

PELORIC DENDROBIUMS OF NORFOLK ISLAND

J. Bruce Irwin
192 Bellevue Street, Otumoetai, Tauranga, New Zealand.

During October 1989, I spent eighteen days on Norfolk Island as a guest of Beryl and Owen Evans, both widely known for their interest in all aspects of nature. Owen arranged a permit for me to collect botanical specimens for the purposes of illustration.

On our first foray into the National Park, he introduced me to *Dendrobium macropus* (Endl.) H.G. Reichb. ex Lindley, which was flowering at that time. I have spent many days drawing New Zealand native orchids, but I was on Norfolk for a holiday. Then Owen spoke of another peloric *Dendrobium* which had been reduced recently to a synonym of *D. macropus*. Ron Maunder, an orchid grower from Tauranga, pricked up his ears - so did Rhys Gardner from Auckland Museum: we were all hooked.

After a long search of the western slopes of Mt Pitt, we at last found *D. brachypus* (Endl.) H.G. Reichb., sharing the same tree as *D. macropus*. Whereas *D. macropus* is almost as slim as a pencil (Fig. 1), *D. brachypus* is very short and stout (Fig. 2). Despite their very different general appearance, both forms have flowers which are most un-orchid-like in appearance. They lack the distinctive labellum of the genus *Dendrobium*, all three petals being alike in shape (Fig. 2). As a consequence the familiar *Dendrobium* spur is also missing. Even the column shows little affinity with others in the genus (Fig. 2). Probably these unusual characteristics have evolved because the flowers appear to be strictly self-pollinating. Vegetatively, the pencil-slim *D. macropus* resembles the common *D. gracilicaule* F. Muell. of Eastern Australia. However, Peter Green of Kew considers the Australian plant to be a subspecies of the earlier named *D. macropus*, while Mark Clements of Canberra Botanic Gardens treats *D. gracilicaule* as a species separate from *D. macropus, D. brachypus*, and *D. comptonii*:

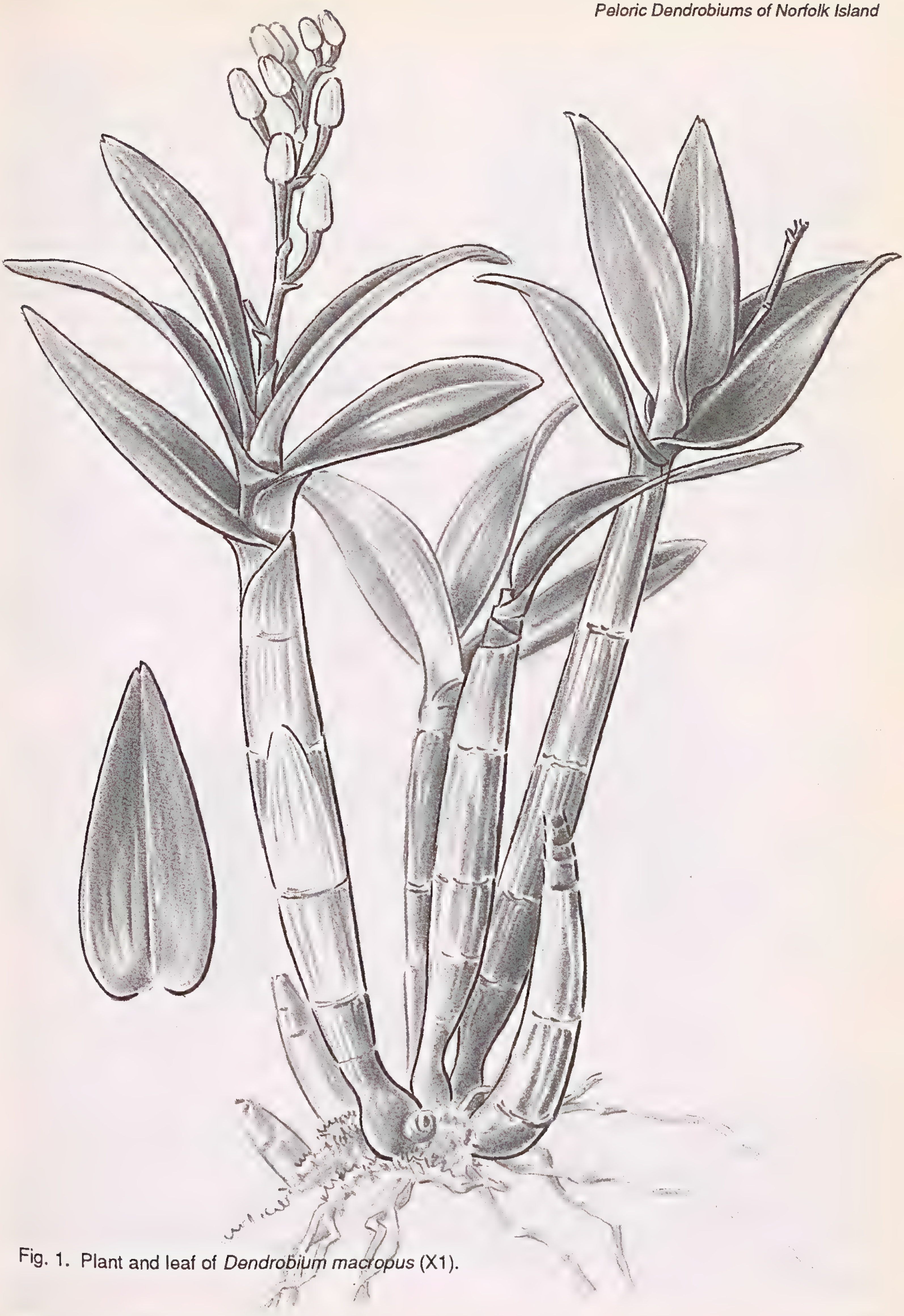


Fig. 1. Plant and leaf of *Dendrobium macropus* (X1).

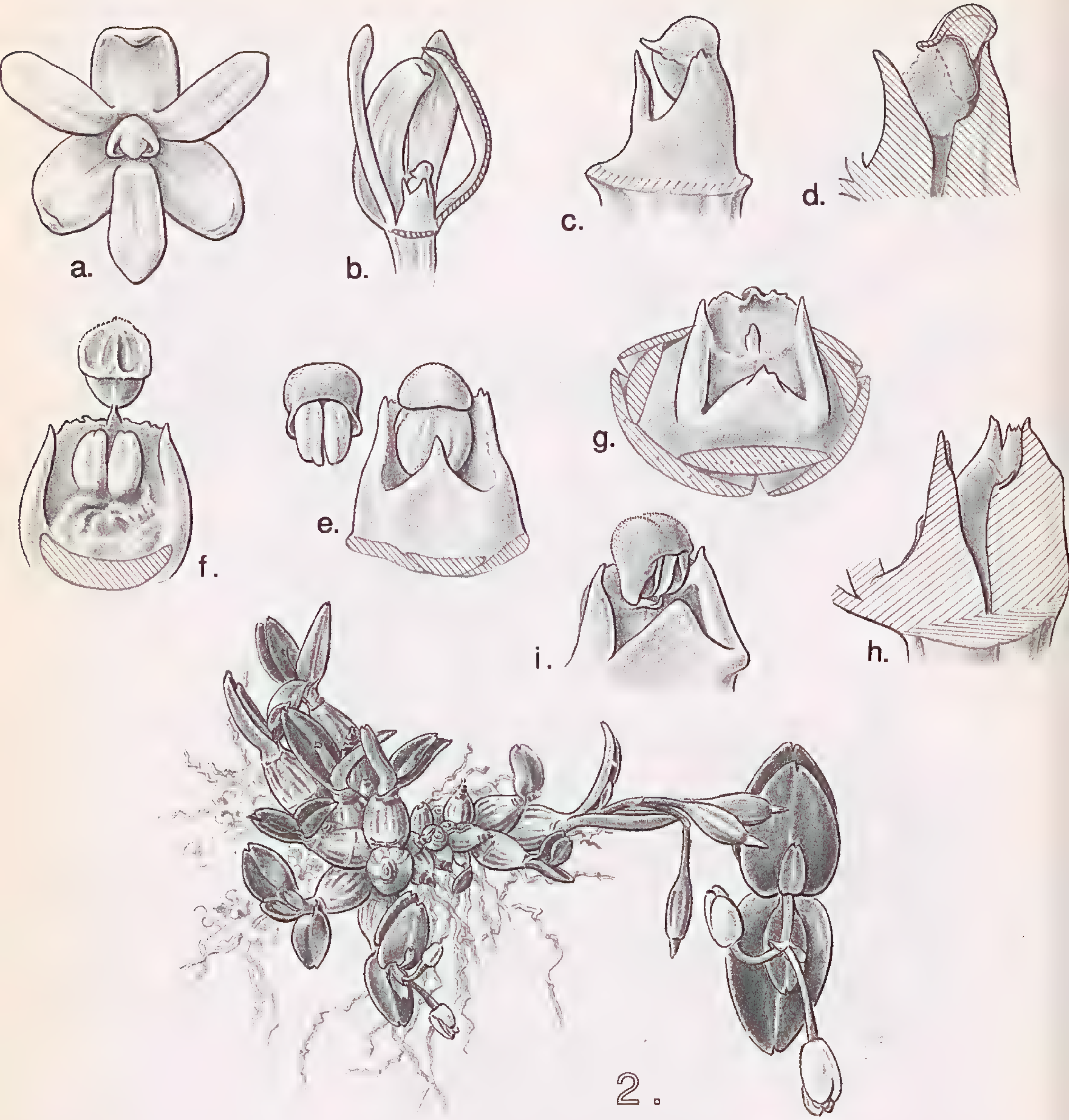


Fig. 2. Plant (X1), leaves and flowers (X2) of *Dendrobium brachypus*; (a) Flower (X6) from above; (b) Flower from side with petal removed to show column; (c) Column from the side with intact anther; (d) Column from side sectioned longitudinally; (e) Column from front, note extra column lobe in front of upward tilted anther which is in view because of vestigial rostellum; (f) Column from front with frontal lobe removed and anther tipped back, note pollinia in contact with stigma; (g) Column from front with anther removed to show vestigial rostellum; (h) Column from side showing vestigial rostellum flattened against column by anther; (i) top of column of pickled flower with empty anther and pollinia missing, note rostellum is pushed forward by anther.

I presume that *D. macropus* evolved from an insect-pollinated ancestral form which, through pressure of circumstances, was forced to adapt to self-pollination. Once the new method of pollination was firmly established, flower structures would evolve to suit the greatly changed requirements. Later, *D. brachypus*, in its common form, may have originated as a sport. Without the ability to cross-pollinate with mainstream plants, *D. brachypus* would be perpetuated by the virtual cloning effect of self-pollination.

The typical *D. macropus* seems to be well defined and very stable taxon. *D. brachypus*, on the other hand, is more restricted in its distribution, and is much more variable in form. I feel that the variability is not the result of crossing with *D. macropus*. Rather, the original sport may have produced mixed progeny which have now settled down to yield a series of self-perpetuating forms.

I found the column of *D. macropus* and *D. brachypus* difficult to interpret, partly because the whole flower (even pollinia) is a uniform pale cream. In most dendrobiums, the pollinia are housed in a rather deep pit (the clinandrium) and are covered by the anther cap which closes down onto the prominent ledge-like rostellum. Self-pollination is thus virtually impossible. *D. macropus* on the other hand has been adapted to ensure self-pollination. The clinandrium has been reduced to a sloping ledge. The rostellum too is reduced to a wisp of material which is either appressed to the sloping clinandrium or pushed downward out of the way by the anther. Once freed of the anther cap, the pollinia can drop directly onto the stigma. Perhaps to ensure that pollen can not fall outside the stigmatic pit, a prominent, triangular extra column lobe has developed in front of the stigma, completely concealing it.

Clearly all adaptations to the column facilitate self-pollination. Because these adaptations are so extensive, they must have been initiated a very long time ago, and they are so complete that a reversion to a more normal form in the future must be very unlikely. The apparently freakish *D. macropus* will exist on Norfolk Island for a long time to come.

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AUSTRALIAN NATIVE ORCHID HYBRIDS

(New registrations from lists in *The Orchid Review*, February to March 1991. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review.*)

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Elegant Nancy	Peewee x *bigibbum*	J.W. Gaff
Nukara Gold	Tully x Tweed	K. Harris
Pterostylis		
Dunkle	Cutie x *pedunculata*	L. & M. Nesbitt
Iron Baron	*baptistii* x *rogersii*	L. & M. Nesbitt
Talhood	Hoodwink x *cucullata*	L. & M. Nesbitt

DATE CLAIMER: PROPOSED TRIP TO 14TH WORLD ORCHID CONFERENCE, GLASGOW 1993.

Following the successful trip to the 13th World Orchid Conference in Auckland, New Zealand in 1990, ANOS Council has decided to organise a trip to the next World Orchid Conference to be held in Glasgow, Scotland, in April 1993.

As was the case for the New Zealand trip, Jetset have again produced the best package. They have provided a number of options, and the arrangements for the trip are flexible. The proposed tour includes:

* Return economy class group airfares
* Accommodation in twin bedded rooms with private facilities, including taxes
* Accommodation in Glasgow will be at the Moat House Hotel, right next door to the Conference Exhibition Building.
* Return transfers between airports/stations and hotels by private coach
* Some meals
* 3 day sightseeing tour in Lake District
* Trafalgar's European Accent Tour
* First class rail Glasgow/London
* Porterage of 1 suitcase throughout
* Jetset Travel ticket wallet and baggage tags.

You may feel that part of the trip is too long for you, in which case you can leave the tour and come home after the conference, or on the return from Europe.

Not included in the tour costs are: most meals, departure taxes, visa fees, insurance, gratuities of any kind, excess baggage charges, personal items.

Prices are based on a minimum of 20 people travelling as a group. Should the group fail to reach this number, an increase in price may be necessary. Fares and prices are based on tariffs and costs applicable on 1 February, 1991, and are subject to change without notice in line with airlines, hotels, motor coach operators' costs.

Tour costs per person range from $6,380 to $7,598, depending on tour options.

Be early. Place your name down if you are interested in making the trip. You will be placed under no obligation if you decide to drop out at any time before the trip departs. If you decide to go, **you will not be required to pay any deposit until 1 July 1992.**

Persons interested in the trip should contact Barry Collins, Tour Organiser, 245 Avoca Street, RANDWICK NSW 2031 ('Phone numbers: Randwick home - 02-398-6448; Berkeley home - 043-88-5761; Work - 02-698-0336.)

RESEARCH ACTIVITIES: PROPAGATION OF AUSTRALIAN TERRESTRIAL ORCHIDS

Chief Investigators: Kingsley Dixon and K. Sivasithamparam

A Federal Government grant has been awarded to researchers at Kings Park and Botanic Garden, Perth, and the Soil Science and Plant Nutrition Group, University of Western Australia, to investigate the role of bacteria in improving growth and development of Australian native terrestrial orchids. Since 1987, bacteria have been observed to be involved in the natural growth of orchids in the field and also to promote orchid seed germination in the laboratory.

An important component of soil fertility is the existence of the soil microbial community. Among the organisms present in the soil are a myriad of different types of bacteria and fungi. Bacteria are microscopic unicellular organisms while fungi are generally multicellular. These two components of the soil 'microflora' interact with each other and with plants to influence plant growth. As well as having deleterious influences on plant growth by causing diseases, some bacteria and fungi are also known to benefit plant growth. Classical examples include the fixation of atmospheric nitrogen by some soil bacteria and the formation of beneficial associations by some soil fungi with the roots and stems of many plants. Orchids form symbioses with fungi but the influence of soil bacteria on orchid growth is much more poorly understood.

The presence of bacteria in the underground tissues of Australian native orchids was first noted over 50 years ago and it was proposed that they were involved in some way in the nitrogen nutrition of the plants (Rogers, 1933). No further research was conducted until recently when a French researcher, Dr Pierre Milon rediscovered the existence of the bacteria together with botanists at Kings Park and Botanic Garden. Studies at confirming the existence of the bacteria and their role in the healthy growth and development of native orchids were commenced at Kings Park and Botanic Garden in 1987.

Bacteria were subsequently isolated from many species of Western Australian terrestrial orchids. Meanwhile work at the Pasteur Institute in Paris by Dr Pierre Milon and colleagues found bacteria in the tissues of 16 species of European terrestrial orchids and confirmed the identify of some of the bacteria.

The symbiotic germination of terrestrial orchid seed in the laboratory is achieved by a simple procedure using an oatmeal based agar medium onto which orchid seed is spread and the appropriate beneficial fungus added. Germination occurs in 3-4 weeks (Ramsay *et al.* 1986). An exciting finding occurred when some of the bacteria were shown to significantly promote the symbiotic germination of *Pterostylis vittata* var. *vittata* seed by using the same oatmeal technique (Wilkinson *et. al.* 1989).

Work was bolstered in 1989 when Dr Kingsley Dixon of Kings Park and Botanic Garden and Dr K. Sivasithamparam of the University of Western Australia, received a two year grant from the Australian Research Council to further study the role of bacteria in the growth and development of Australian terrestrial orchids. The aims of this study, which is currently being carried out by Kevin Wilkinson, a post-graduate student, include the elicitation of the mechanisms by which the bacteria influence germination, their role in the growth of adult plants and the application of these methods to improve the horticulture of Australian terrestrial orchids.

So how will this work benefit orchid growers? This program will advance our understanding of microbial influences on germination and growth of terrestrial orchids. Ultimately terrestrial orchids may be easier to germinate and grow to maturity including many difficult to grow, 'recalcitrant' species. Nurseries will also be better equipped to produce 'high health' terrestrial orchids including for the export market. This research will also help to protect our native orchid flora by reducing collecting pressure on wild populations and aid in the *ex situ* conservation of rare and endangered species.

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RESULTS OF NSW EPIPHYTES SURVEY 1988

G. Walsh
7 Leslie Court, Werrington NSW 2760

The following information is the result of the NSW Epiphytes Survey which was distributed to ANOS Groups in NSW during June 1988.

[Editor's note: Except for the varieties of *Dendrobium speciosum, D. tetragonum* and *D. teretifolium* (in which case readers may wish to consult Clements 1989), the species in the following list have been recorded under the synonyms listed by Clements (1989), the correct name being in italics in the list: Bulbophyllum aurantiacum as *B. schillerianum*; B. crassulifolium as *B. shepherdii*; B. tuberculatum as *B. argyropus*; Dendrobium beckleri as *D. schoeninum*; D. mortii as *D. bowmanii*; D. tenuissimum as *D, mortii*; Oberonia meulleriana as *O. complanata*; O. palmicola as *O. titania*; Pteroceras spathulatus as *Sarcochilus spathulatus*; Taeniophyllum wilkianum as *T. meulleri*.]

Species	Total (out of 78)	Percent.
Bulbophyllum		
argyropus	2	2
bracteatum	12	15
elisae	45	58
exiguum	65	83
globuliforme	1	1
minutissimum	14	18
schillerianum	43	55
shepherdii	61	78
weinthalii	19	24
Cymbidium		
canaliculatum	44	56
madidum	44	56
suave	77	99
Dendrobium		
aemulum		
brush box form	53	68
iron bark form	60	77
rainforest form	40	51
bowmanii	14	18
cucumerinum	50	64
falcorostrum	62	79
gracilicaule	69	88
kingianum	69	88
kingianum var. *alba*	15	19
linguiforme	76	97
monophyllum	25	32
mortii	45	58
pugioniforme	70	90
schneiderae	12	15
schoeninum	59	76
speciosum		
var. *hillii*	68	87
var. *speciosum*	77	99
striolatum	67	88
Dendrobium		
teretifolium		
var. *aureum*	23	29
var. *fairfaxii*	41	53
var. *teretifolium*	65	83
tetragonum	65	83
X *delicatum*	23	29
X *gracillimum*	39	50
X *suffusum*	7	9
Liparis		
coelogynoides	41	53
reflexa	73	94
Oberonia		
complanata	4	5
titania	19	24
Sarcochilus		
australis	47	60
ceciliae	35	45
dilatatus	4	5
falcatus	70	90
big white form	37	47
fitzgeraldii	27	32
hartmannii		
northern form	22	28
southern form	23	29
hillii	52	67
olivaceus	63	81
spathulatus	25	32
weinthalii	9	12
Papillilabium beckleri	37	47
Peristeranthus hillii	17	22
Plectorrhiza tridentata	62	79
Rhinerrhiza divitiflora	44	56
Schistotylus purpuratus	13	17
Taeniophyllum meulleri	3	4

RAREST SPECIES IN NSW

1st - *Bulbophyllum globuliforme*
2nd - *Bulbophyllum argyropus*
3rd - *Taeniophyllum meulleri*
4th - *Oberonia complanata*
5th - *Sarcochilus dilatatus*

Most successful field observer was Mr Doug Binns who only left four blanks on his survey form and these were numbers 1, 2, 3 on the rarity list above, plus *Dendrobium* X *suffusum*. Congratulations Doug!

And now for the big question: What does it all mean? I would think that the broad answer is "not a great deal". The survey has revealed no earth shattering statistics. But what it has achieved is a large degree of confirmation about the rarity or otherwise of our native orchids. There is enough substance in the results to accurately adopt them as a sound point of reference for both the amateur and serious hobbyist, as well as the amateur botanists amongst us.

There has certainly been nothing like it put together in the past to my knowledge. Some may argue that it has never been important enough to do so. But I take the view that it does add something to our knowledge of native orchids, in NSW at least, and that cannot be a bad thing. Even if the facts and figures are only perused during a cup of coffee. It is a great pity that there were not more replies forthcoming, particularly from the districts where the rare species all seem to congregate. Who knows? With a few more replies it may have been a completely different ball game.

One thing that became obvious to me as I sorted through the replies was that a good many of the people responding are not fully conversant with the epiphytic orchid flora of NSW. This is particularly true in the case of the various forms of *Dendrobium aemulum* and *D. teretifolium*.

By far the most common form of *D. aemulum* reportedly seen in the wild by respondents was the "ironbark" form, with many more sightings than both the "brush box" and "rainforest" forms. As the compiler of the survey results, I am going to take the liberty of expressing some doubts about these results. I believe that some people are possibly mixed up about the form of *D. aemulum* that they have seen.

It is generally accepted that the "ironbark" form is no where near as common as the other two forms. This misunderstanding probably arises because the common name for *D. aemulum* is, unfortunately, "The Ironbark Orchid". Some people may mistakenly believe that the *D. aemulum* plants they have seen must therefore be the "ironbark" type. This certainly is not the case. The following may help those who are unsure to identify the forms with more certainty.

The "brush box" form: Grows virtually always on the permanent bark of the trunk and larger limbs of the brush box tree, *Lephostemon conferta* (formerly *Tristania conferta*). Generally found north of Bulahdelah and often grows its pseudobulbs in all directions from the rhizome, including downwards. Pseudobulbs are generally longer and thinner than in the other forms of *D. aemulum*. It is by far the most abundant form within its range.

The "ironbark" form: Restricted to the trunk and limbs of ironbark *Eucalyptus* species, usually growing high up in the host tree above the level of most bushfires. The host trees invariably grow in the protection of a valley or gully. Rare specimens of this form are seen on other species such as *Casuarina torulosa*, although vegetative proportions of such plants vary, the pseudobulbs and leaves of the "ironbark" form are considerably stouter than other forms, and indeed some specimens look like small plants of *D. speciosum*. This form is most often encountered between Batemans Bay and the Hunter River, but also occurs right up to Qld. I recall seeing plants on ironbarks near Brisbane that did not fit this description however, and were identical to the normal "rainforest" form from central NSW. So identification can sometimes prove difficult and contradictory.

The "rainforest" form: South of the Hunter River, this is by far the most common form of *D. aemulum*. This is the form that occurs in nearly all the numerous gullies in the vast Hawkesbury Sandstone Region between the Illawarra and the Hunter. Its favoured host tree is *Backhousia myrtifolia*, the common myrtle. It is less frequently found on a range of other hosts such as coachwood. Its pseudobulbs are not nearly as swollen as the Ironbark form and are generally pencil thick for most of its length.

Another species that seems to have caused confusion is *D. teretifolium*. The various forms can be summed up as follows:

D. teretifolium var. ***teretifolium:*** This is the variety found most often in lowland coastal areas and nearly always growing on *Casuarina glauca*, the swamp oak. Particularly prevalent in estuarine and near coastal environs from Narooma to Queensland, it is readily distinguishable by the swollen "rat's-tail" appearance of its leaves, which are far more thickened than in the other two varieties of *D. teretifolium*. It is far more floriferous, the racemes being longer and carrying up to 15 white flowers.

D. teretifolium var. ***fairfaxii***: This is the variety found commonly in the rainforests of New South Wales, from the Border Ranges southwards to the Blue Mountains. The flowers are white with some degree of red striation on the outside base of the segments. Its leaves are often much thinner than variety *teretifolium* and usually longer. It rarely has more than two flowers to a raceme and is far less floriferous than variety *teretifolium*. It commonly grows on rocks.

D. teretifolium var. ***aureum:*** Vegetatively this variety is identical to variety *fairfaxii*. It is restricted in distribution from the Clarke Range near Mackay in the north to the MacPherson Ranges of the NSW-Qld border in the south, where it is the only variety of *D. teretifolium* present. However, specimens originating from the Clarke Range near Mackay have exceptionally thick leaves, rather like *D. teretifolium* var. *teretifolium*, and reminiscent of var. *fasciculatum* from far north Queensland. Frequent plants can also be seen in the Richmond Range, just south of the Qld border. When in flower it is very distinctive because its flowers are a golden colour whereas those of the other varieties are white.

Bulbophyllum tuberculatum, as it was listed on the survey form, also caused some confusion. Many respondents wrote notes to the effect that it only occurs on Lord Howe Island, a dependency of New South Wales. This is not correct. It was discovered growing reasonably abundantly on the upper branches of rainforest trees in the Dorrigo region in the late 1970s, although only in a very restricted locality (Clemesha 1979). It has since been correctly identified as *Bulbophyllum argyropus* and this name is also the correct determination for the species on Lord Howe. The true *B. tuberculatum* only occurs in New Zealand and is quite rare.

The rarest species determined in the survey was *B. globuliforme* with a single sighting. Several other people reported having seen it as well and, as I thought this was possibly a case of misidentification. I approached a few of those for clarification. My suspicions were confirmed. These "doubtful" sightings were made in the Hastings Valley where *B. globuliforme* does not occur - and neither does its only reported host tree, the hoop pine. The only recorded location for *B. globuliforme* in NSW is on the southern side of the MacPherson Ranges.

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IN VITRO PROPAGATION OF TERRESTRIAL ORCHIDS: *DIURIS EMARGINATA* R.Br.

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Summary: *Diuris emarginata* was propagated by asymbiotic embryo culture. Seedlings survived transfer to soil and one plant flowered after 2 years.

INTRODUCTION

The purpose of this article is to give practical information about a reliable method to propagate *Diuris emarginata*, as well as to encourage the propagation of ground orchids by giving a short review of newer literature as a source of basic information for future workers. Easy to reproduce methods of propagation from seed to plants established in soil have not been published for the majority of orchids from north and south temperate climates, although there is great progress in recent years (Beyrle *et al.* 1989, Hoppe and Hoppe 1988).

Many species are reputed to be extremely difficult to grow in outdoor, greenhouse or under light conditions, both as seedlings and as adult plants. For comments on cultural problems see Kasomenakis (1989) and Norman (1983).

Some European, Australian and Japanese orchids are available from commercial sources. Most are propagated vegetatively by divisions from tubers or rhizomes, few by sowing *in vitro*.

Mainly European orchids were used in the research. But it can be expected that the same rules of germination control, and cultural requirements apply to species from similar ecological habitats, even if they are from different continents. The readiness of a seed to germinate asymbiotically is believed to be controlled by the ease with which seed dormancy can be broken, the difficulty of breaking seed dormancy increasing for species that live in colder climates, at high altitudes, or in seasonally dry or otherwise extreme habitats. However, these may be only some of the factors which control asymbiotic germination. Germination *in situ* might also be influenced by periods of dewfall, and by mineral and trace element composition of soil (Möller 1985).

Diuris emarginata R.Br. grows in semi-swamp areas of the coastal plains of south-west Australia under a mild climate. I therefore used *in vitro* methods that work well with the European swamp orchids of the genus *Dactylorhiza*.

The following brief synopsis of the present knowledge of the *in vitro* propagation of terrestrial orchids is based on a search of literature on a variety of species.

LITERATURE REVIEW

Concerning asymbiotic germination of mature seeds several parameters have been found to be of particular interest:

1. Seed storage and cold treatment before (Pritchard 1984) and after inoculation on the medium (Ballard 1987, Ishihashi 1989).
2. Treatment of seeds with calcium hypochlorite plus Tween 8O, more or less correlating with reduction of 2,3,5-Triphenyltetrazoliumchloride (TTC), and with germination rate (Van Waes *et al.* 1986a, 1986b). For information on TTC-test see Altmann (1976) and Towill *et al.* (1975).
3. Endogenous (Kinderen 1982) and exogenous plant growth substances. Auxins are known to reduce germination of some species with easy to break dormancy, but more difficult to germinate species might require auxins (Borriss *et al.* 1986).
4. Inhibition of germination by nitrate (Eiberg 1970, Mead *et al.* 1979), or by macro-elements, nitrate and ammonium (Van Waes 1986b, Dijk 1988).

These and other parameters might influence each other in many ways, thereby explaining some of the inconsistencies reported by several authors. For instance, one could speculate that chilling could either inhibit (Van Waes 1986b) or promote (Borriss 1970) germination in *Epipactis* species, depending on the other parameters involved.

For general information on plant tissue culture see Fossard (1976) and Reinard *et al.* (1982).

The most difficult step seems to be the establishment of seedlings in soil. The following conditions, leading to success with larger numbers of plants of several species, were recommended in the literature.

1. Culture in inorganic media of fine to medium grade quartz sand. Tensiometric measurement of soil humidity was coupled to drip irrigation with deionised water plus 0.1 g L^{-1} fertiliser during active growth. Overwatering was prevented and many plants were brought to bloom (Frosch 1983).
2. Culture in a mix of 3 parts washed river sand plus 2 parts soft wood shavings plus 1 part leaf mould. Symbiotic seedlings developed well with transfer in winter months (Clements 1981).
3. Culture in a medium of expanded clay (the type used for hydroponics, broken into pieces of 0-2 mm) plus 15% leaf mould, or preferably 9 parts of sphagnum peat (pH corrected to 6 with calcium carbonate) plus 1 part expanded clay (or vermiculite) plus a little leaf mould. There was good success with symbiotic seedlings (Beyrle *et al.* 1987).
4. Culture in TKS1 (a commercial substrate, made of peat, pH adjusted with calcium carbonate, with fertiliser added: 120 mg L^{-1} N; 51 mg L^{-1} P; 183 mg L^{-1} K). This substrate was inoculated with a symbiotic fungus isolate. There was good success with seedlings grown asymbiotically until transfer to soil. In peat with low pH, or high nutrient content, fungi did not support growth or were parasitic (Beyrle *et al.* 1989).

METHODS

Seed material: The seeds were mature and had a dark brown to black testa; the surface of the embryo was uncoloured. Before receipt, seeds probably were stored at room temperature for weeks or months. They were exposed to reduced pressure for 2 days over silica gel, and then stored at -20oC in a deep freezer in the absence of silica gel.

***Pretreatment of seeds*:** Seeds were suspended in a solution of 1% (w/v) sucrose plus 1% (v/v)

Tween 80 in a 20 ml screw cap vial, shaken repeatedly, exposed to reduced pressure, and soaked for 24 hours. The seeds were then washed several times and treated with a fresh filtered solution of 5% (w/v) calcium hypochlorite (Fluka, CH-9470 Buchs) plus 1% (v/v) Tween 80 for 15 minutes, followed by repeated rinsings with sterile water.

Chemical seed testing: A small quantity of seed treated as above, was incubated in the dark at 25°C in 1% TTC solution in a phosphate buffer at pH 7 for 2 days (1 g TTC in a buffer made of 100 ml distilled water plus 0.9 sodium ortho-phosphate plus 1.1 potassium dihydrogen ortho-phosphate. Do not expose this mixture to sunlight as it will change the TTC to red formazan.)

Seed sowing: Seeds were transferred with a spatula, or were resuspended in water and appropriate amounts transferred to the culture vessels.

Sterile working area: Washing of seed, sowing and transfer to new media were done in a laminar flow box.

Culture media: The composition of Medium 1 (germination) and Medium 2 (subculture) are given in Table 1. Iron was chelated with EDTA and then added. The media were autoclaved for 30 minutes, pH adjusted to 6, and birch sap added prior to autoclaving.

Vessels and culture conditions: Two sizes of flasks similar to baby food jars were used. To the smaller flask (8 x 6.5 cm), 60 ml Medium 1 was added, while 100 ml Medium 2 was added to the larger flasks (8 x 9.5 cm). The flasks were closed with autoclavable plastic screw caps allowing exchange of air. During germination, the flasks were kept in darkness at 22°C, but were moved to a table near a window but kept out of direct sunlight, once protocorms had appeared (after about 1 month).

Transfer to soil: The following media were tested: fine grade Meranti wood fibres; pumice (washed, 1-2 mm); lavalit (a red lava rock 0-3 mm); expanded clay (2-6 mm); limestone loam; quartz sand (0-1 mm); washed builder's sand with gravel (1-5 mm); perlite (0-5 mm), and various mixtures of these and charcoal.

Five to twenty seedlings were planted in 12 cm clay pots. Plants were kept under 15 hour photoperiods, illuminated by 36 watt Sylvania Gro-Lux lamps placed 10 cm above the leaves. Watering was done with deionised water and the soil never was allowed to dry out completely. During the first 3 months 0.1 ml/l macro-element and the same amount of micronutrient fertiliser was added. Temperature was about 17°C during the day, and 10°C at night. Air humidity was around 50-60 %.

RESULTS

TTC-test: Reduction of TTC to a red colour nearly reached 100%.

Seed emergence: Germination after one month also was near 100% with a low rate of delayed germination.

Transfer to Medium 2 with root and shoot induction: Development ceased when the proto-

Table 1. Composition of culture Medium 1 and Medium 2.

Component	Medium 1 (mg L^{-1})	Medium 3 (mg L^{-1})
1. Inorganic salts		
KH_2PO_4	750	750
$MgSO_4.7H_2O$	250	250
$MnSO_4.H_2O$	3.8	3.8
H_3BO_3	5	5
$ZnSO_4.7H_2O$	5	5
$Na_2MoO_4.2H_2O$	0.25	0.25
$CoCl_2.6H_2O$	0.025	0.025
KI	0.025	0.025
$FeSO_4.7H_2O$	27.85	27.85
$Na_2EDTA.2H_2O$	37.25	37.25
2. Organic compounds		
Sucrose	12000	12000
ThiamineCl HCl	0	5
Nicotinic Acid	0	5
Niacinamide	0	5
Pyridoxol HCl	0	5
Folic Acid	0	0.5
myo-Inositol	0	1000
L-Glutamine	0	50
L-Cysteine $HCl.H_2O$	0	50
3. Undefined substances		
Peptone from Lactalbumine	0	400
Yeast Extract	0	500
Birch Sap[a]	250 (ml)	0
Activated Charcoal p.A.	0	400
Agar (high gel strength)	6000	6000

[a] Bleeding sap from birch trees which only flows in spring when the new leaves appear.

corms became crowded. When placed on Medium 2, (10-30 plants per flask) the plants produced small roots and shoots, 2-5 cm in length. Few protocorms discoloured and died.

Transfer to soil: Only the few larger plantlets showed growth and produced additional roots and leaves in Meranti substrate. Most plants in other substrates were lost after some weeks or months. These died of rot, probably due to overwatering or wilted when substrates became too dry. Meranti provides a constant humidity without overwatering. Smaller plants, 1-5 cm in size, did not grow larger, many becoming smaller from season to season. From the group of the larger seedlings, one flowered after two years from seed.

DISCUSSION

A number of factors could be responsible for the poor development and growth of the deflasked seedlings. These could include: the lack of mycorrhizal association; a need for cold treatment (Borriss 1970); a need for seasonal changes in temperature and day length; an unnatural spectral energy distribution provided by Gro-Lux lamps; air movement; and air humidity. The eventual flowering of one plant occurred after the substrate was allowed to become dry. The shoot died after flowering.

It was interesting to compare the results from *Diuris emarginata* in this study with those from seedlings of other species. Under the growth conditions described here, adult European orchids could be flowered in the vegetative period following transfer to Meranti. Thereafter, they lost vigour, and newly formed tubers decreased in size. A high percentage of the seedlings of all ground orchids tested survived for several years, but those of some species, such as *Thelymitra crinita, Disa racemosa* or *Dactylorhiza majalis*, did not progress further, producing smaller leaves and tubers each year. Larger plantlets of two species, *Diuris emarginata* and *Cephalanthera rubra* increased in size, but in the next growth cycle, the same loss of vigour was experienced.

ACKNOWLEDGMENTS

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THE SEARCH FOR THE PERFECT MOUNT

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[Editor's note: This paper was presented at the First Australasian Native Orchid Conference, 28-30th September, 1990, The University of Wollongong, Wollongong, NSW. It is published here with the permission of the author and the Council of ANOS Inc.]

As cultivators of orchids, probably the first decision we make about each plant is to pot or to mount (or totem, post or slab and whatever else you wish to call it). I suppose a mount by definition is anything other than a pot. I'm sure that many times the decision is not made consciously. Who would grow *Dendrobium speciosum* var. *speciosum* in anything other than a container, and *Rhinerrhiza divitiflora* anywhere other than on a totem? Having made the decision to mount our plant, what are the advantages and disadvantages of this type of culture?

In its favour, a mount usually has excellent aeration and drainage and the root growth, or lack of, is there in front of you for immediate inspection. They are light weight, efficient users of space in a glass or shade house and provide a wide variety of substrates to suit the water-retention needs of various genera and species. To my mind, the great disadvantage of mounts is, generally, the ability of orchids to outlast such a host. Pots will last for ever and it is a simple process to pot on a plant without too much disturbance to the root system. When a mount deteriorates or an orchid outgrows it, major surgery is often necessary to effect the transplant to a replacement host. Roots are invariably damaged or destroyed and as careful as you are, the specimen must suffer some setback.

There would not be many growers who do not strive to grow bigger, brighter and better plants from year to year and in competition with other growers. I am no different and early in my orchid growing career, I realised one of the cultivation limitations was the necessity to remount orchids.

This paper represents some of the steps taken in my search for the 'perfect' totem. I will not so much dwell on the more traditional mounts such as tree fern, ironbark and hardwood etc., but discuss some alternatives with which I have experimented.

There are three main reasons that most of the traditional natural mounts become unsuitable for their orchids; insect attack, fungal attack and too small or the wrong shape for the plant.

The pest of my orchid existence is that wretched little *Lepidoptera* commonly known as the 'cork borer'. Its scientific identify is unknown to me but the evidence of its existence is all too familiar. The purpose in life of the larvae of this dingy little grey moth is to munch its way through all manner of orchid hosts leaving behind characteristic accumulations of round pin-head size excreta. It has no particular bias in its diet, consuming natural and processed cork, tree fern, Mylan board, ironbark, hardwood, red cedar and even bark chunks in bark and gravel potting mixes. In serious attacks it can severely damage the fine roots of orchids like *Bulbophyllum* spp. to the point that the plant falls off the host.

The pest can be managed by vigilant squashing whenever occurring, but, be warned, the larvae are surprisingly quick and appear to vanish down passages in the frass. Contact insecticides also work but it is difficult to reach the grub when hidden inside its mound of web and dung. A bug-proof growing structure that excludes the winged stage of the pest is a great advantage.

Fungal attack on orchid mounts is most prevalent in totems made from the limbs of paperbark trees, either the Broad-leaf Paperbark, *Melaleuca quinquinervia*, or the Prickly-leaf Paperbark, *M. stypheloides*. The bark itself lasts for years and years but the soft timber is very susceptible to invasion by various fungi. Eventually, even as rapidly as within two or three years, the heartwood decays and the grower is left with a mass of roots, the bark and nothing else. There are ways to fixing this, such as inserting another length of paperbark or even PVC pipe into the void but the goal in the first place should have been to provide the orchid with a long-lasting and low maintenance host.

I guess under optimum conditions that most orchids, particularly the rhizomatous species, will outgrow the original mount. Not always a problem but the expected results will depend on the vigour and extent of the root system of the plant. I am convinced though, that we undermount (if there is such a word) far too many of our orchids. In particular, the lack of success in cultivating the small

Sarcanthinae species such as *Sarcochilus dilatatus, S. hillii, S. australis* and *Papillilabium beckleri* for example, I attribute in part to the shape of the mount.

Far too often I see them stuck on small squat slabs where in the bush their root systems often extend for metres along thin branches and twigs. I have had very satisfying results deflasking these types of orchids onto teak, red cedar and hardwood totems up to a metre long but only 1 cm square in cross section. The establishment of many of these seedlings has been rapid, with roots extending to the ends of the totem within about 18 months; going a long way to replicating their growth habits in the scrub.

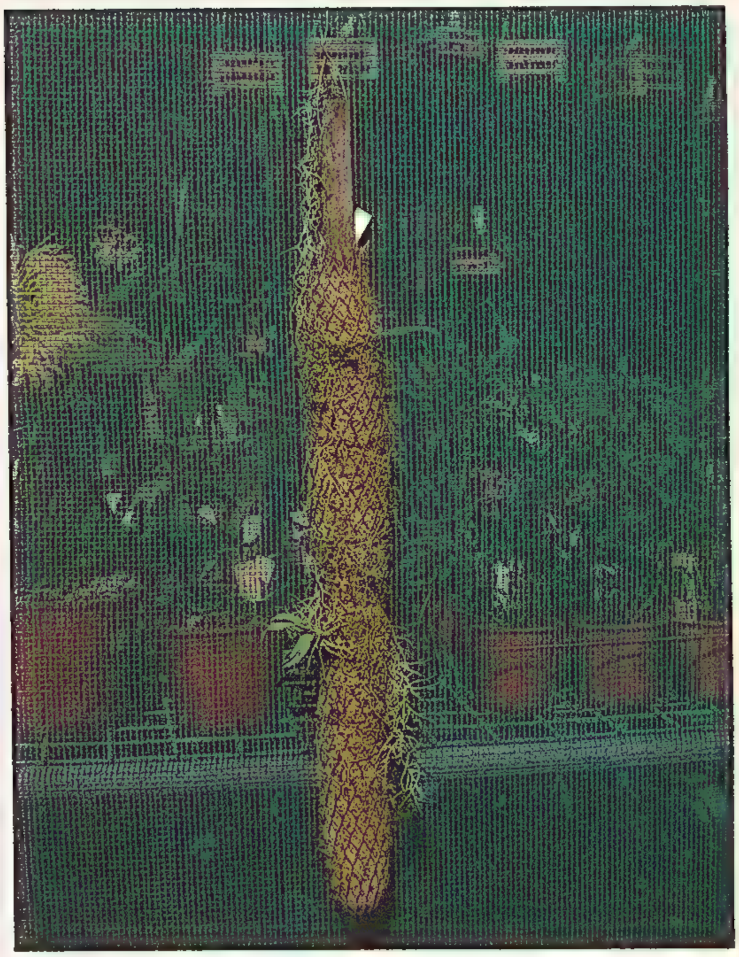
If I might then rearrange an old saying, "don't worry about the width, feel the length".

At the start of this search for the perfect mount I determined that what I was looking for was permanency in the host, resistance to insect and fungal attack and a substrate attractive to a wide range of orchid species.

My trials led me down two basic paths. The first was to see what use could be made of new, manufactured materials. The second sought to take advantage of the longevity and versatility of paperbark but overcoming the problem of the inevitable and sometimes very rapid decay of the wood.

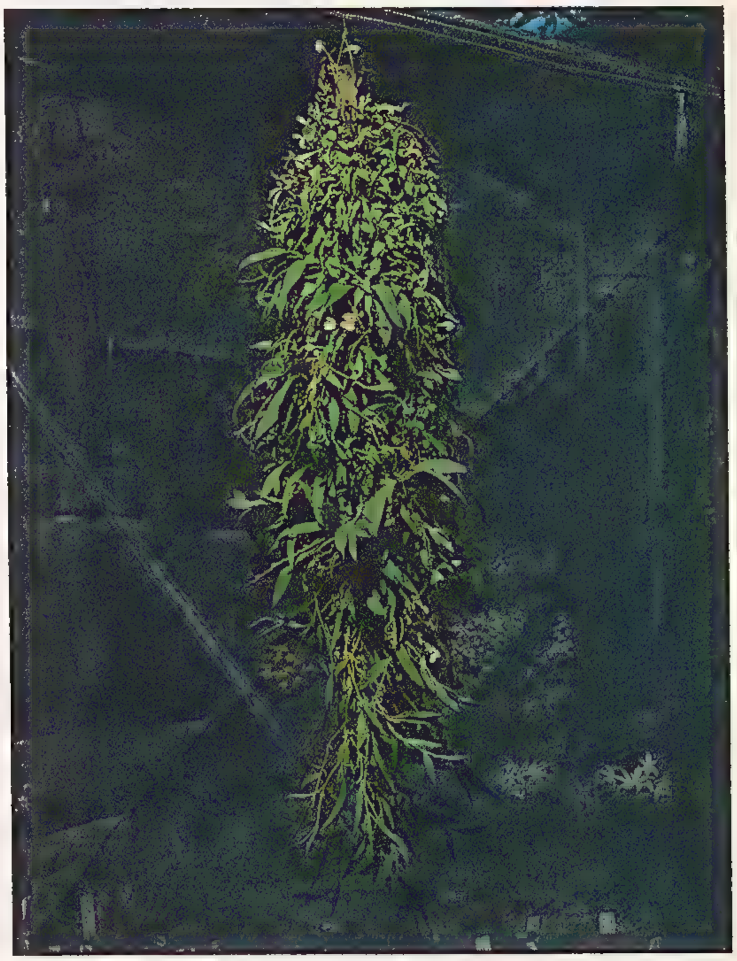
There were a couple of dead ends on the first path. One was Mylan board, a manufactured timber product very much like chipboard, imported from S.E. Asia and sold in nurseries especially for mounting epiphytic plants. I gave it a try in about 1984 but have not been impressed to date.

In the first place, any orchid mounted on it took an instant dislike to this host. I had followed the instruction on the pack, soaked the board for 24 hours in water, and was amazed at the amount of red material, presumably a mixture of glue, natural resins and perhaps dye that leached from the block. The pH was obviously very wrong as no orchid root would attach to the thing. After 12 months exposure to the elements I tried the product again. I tried it in the hope that the porous nature of the material would retain a little more moisture than a milled timber totem and be suitable for species such as *S. falcatus* which thrive with moisture around the roots. Results have been average, no better than an ordinary lump of wood. I found it not worth the effort or the expense and have abandoned it.



Above: Coconut fibre surrounding hardwood stake with *Sarcochilus falcatus*

Below: Totem of coconut fibre and hardwood stake wrapped in epiphytic moss and *Pyrrosia* sp. fern with *Sarcochilus falcatus* and *Dendrobium pugioniforme*.



Another nursery line that I have tried are the totems sold for indoor climbing plants. These consist of hardwood tomato stakes surrounded by 2 cm of coconut fibre held in place by a sleeve of plastic mesh. Under my conditions I have not had much success with the raw item, there being a reluctance for the orchid roots to penetrate the coconut fibre. However, when I surrounded the item with a pad of epiphytic moss and *Pyrrosia* sp. fern it made a very attractive and natural looking piece when planted with *Sarcochilus falcatus* and *Dendrobium pugioniforme*.

I have had better success manufacturing long cylinders out of a black plastic mesh product designed for excluding leaves from gutters. It comes in long rolls and when folded along the long axis and sown up the seam with fishing line, forms a cylinder about 6 cm in diameter and as long as necessary.

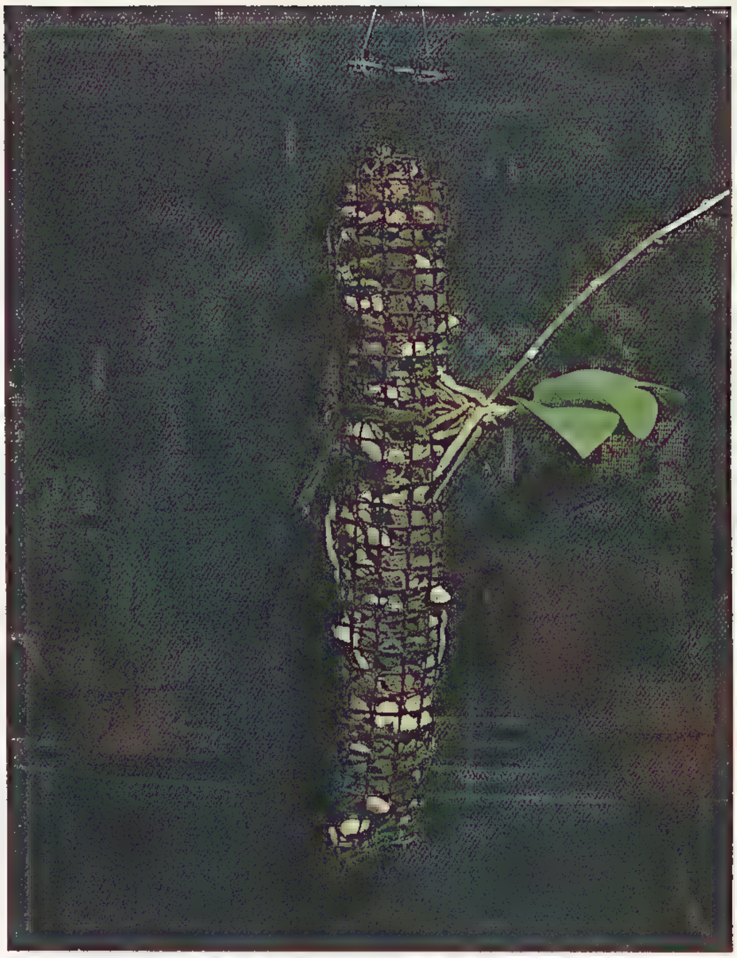
I have tried two different types of fill for this construction; ordinary bark/pebble mix, and expanded clay beads as used in hydroponics.

The popular 1 cm or so bark/pebble mix has been most successful with species with long, thick roots that like to ramble. *Phalaenopsis amabilis* and *Robiquetia wassellii* have taken to it very well. I have only tried *Sarcochilus falcatus* on the clay beads with reasonable results. I initially thought the clay beads would do well as each bead would retain a degree of moisture after watering and they are designed to transport moisture through capillary action when used in hydroponics. There should then be a fairly constant moisture gradient throughout the totem with no soggy spots in the middle. I think this media warrants further trials.

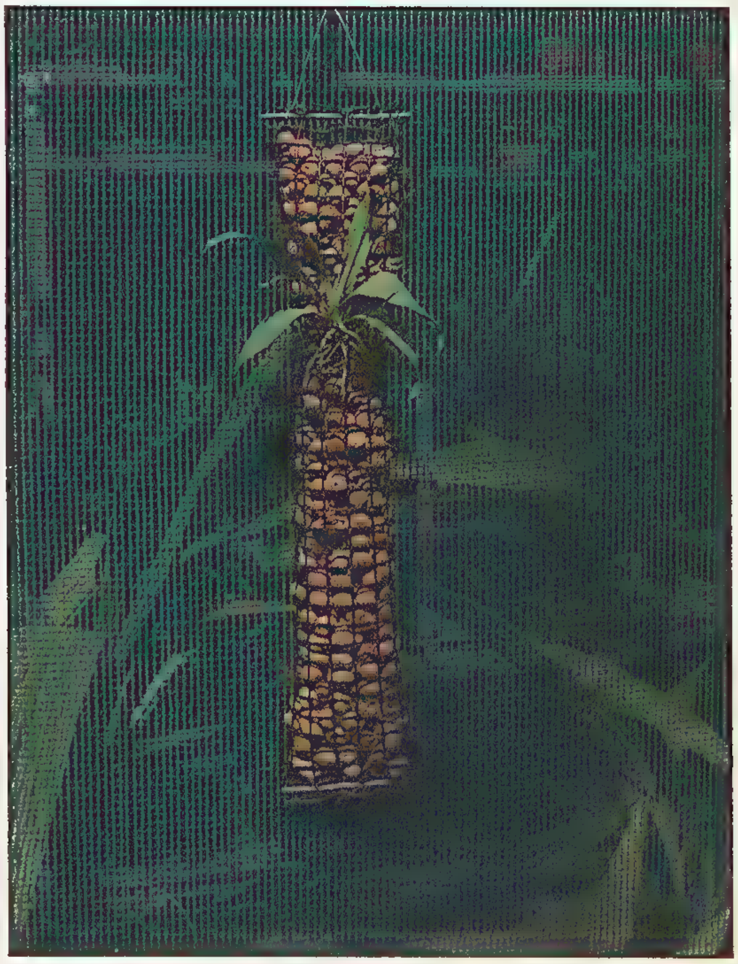
A disadvantage of the gutter guard is the size of the mesh, 1 cm mix can easily fall through! A larger grade mix would be too coarse and would defeat the purpose of the totem altogether. I have located sheets of a different plastic mesh in my local garden centre with holes only 5 mm across. This has been far more successful with another *Robiquetia wassellii* thriving on this mount.

The other line of experimentation concerned how to improve the lasting qualities of paperbark given that the timber can rot away very quickly. Logically, there are two approaches - do something so the wood can not rot away or, replace it.

The life of a paperbark totem can be considerably prolonged by sealing the cut ends somehow to prevent the entry of fungal spores into the wood. I use a specially prepared plastic



Above: *Phalaenopsis amabilis* growing on a totem of gutter guard filled with bark and pebble mix. Below: A gutter guard totem filled with hydroponic clay beads with *Sarcochilus falcatus*.



tree surgery paint that incorporates a fungicide but bitumen paint or even varnish can do the job. This procedure has some limitations in that fungus and insects can invade through small breaks in the bark where a small branch used to be, for example. I have had this happen, ending up with a nice intact top and tail with nothing in the middle.

An improvement on the sealing technique for which I have much regard was developed by Sid Batchelor of Yondi Orchids. In his method, the bark is pared back to the wood for 5-8 cm from each end then charred to seal the timber. I have a *Phalaenopsis amabilis* on one of these mounts and the log shows no sign of deterioration after at least four years in the glasshouse.

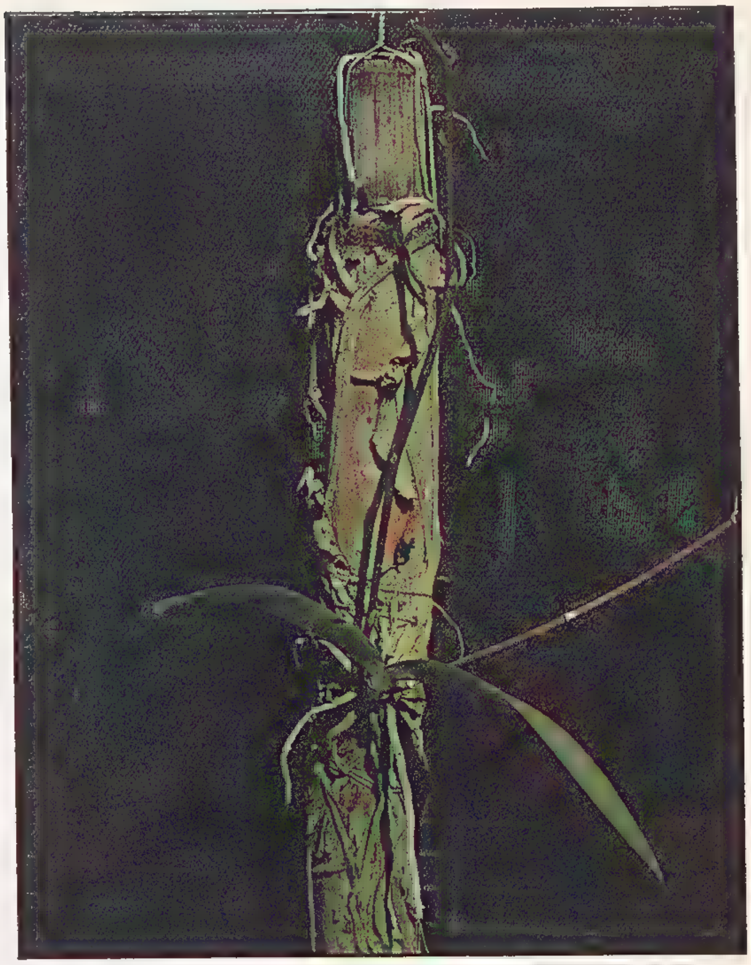
That covers sealing the wood, the other approach is to replace it. Sheets of paperbark are readily available in nearly every local nursery for use by the home gardener for lining hanging baskets. This is very convenient as they are a useful height and width. I first used this product by folding a sheet of it around an old fence paling and wiring it on. A *Dendrobium canaliculatum* has now grown happily in this partnership for six years with the mount showing no obvious signs of decay. I cannot guess its half-life but it will become unsuitable in time as the timber must deteriorate.

An improvement on this replacement technique followed next when I thought to use a length of broom handle, smothered it in PVC glue and rolled it up in the bark. I believe this will last much longer because I sealed the ends with tree paint and the centre is preserved inside waterproof glue. There should be no opportunity for water or fungus etc. to reach the timber. This mount should last the life of the *D. canaliculatum* var. *nigrescens* that calls it home, even under glasshouse conditions.

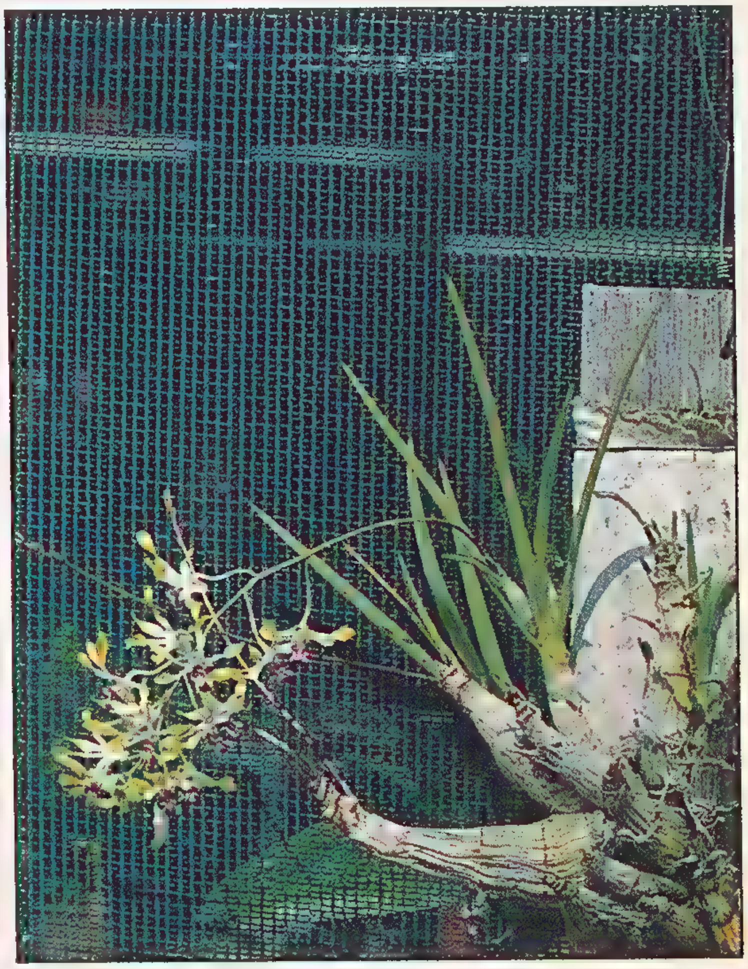
I am always on the look-out for something I can use as a totem and I saw just the thing a few years back in my local hardware shop. On the shelf was a pressure pack can of polystyrene foam and the link was made between this and the paperbark sheets I had at home. How about rolling the paperbark into a tube and injecting it with the expanding foam? Simple but so effective.

I have now made quite a number of these and am very impressed with their suitability and how this marriage of technology and nature meets the criteria I set for myself years ago.

The foam filling is fabulous as it is very light, expands to fill the shape of the tube, absolutely



Above: Paperbark totem as used by Sid Batchelor with *Phalaenopsis amabilis*
Below: *Dendrobium canaliculatum* growing on a totem of paperbark and hardwood paling.



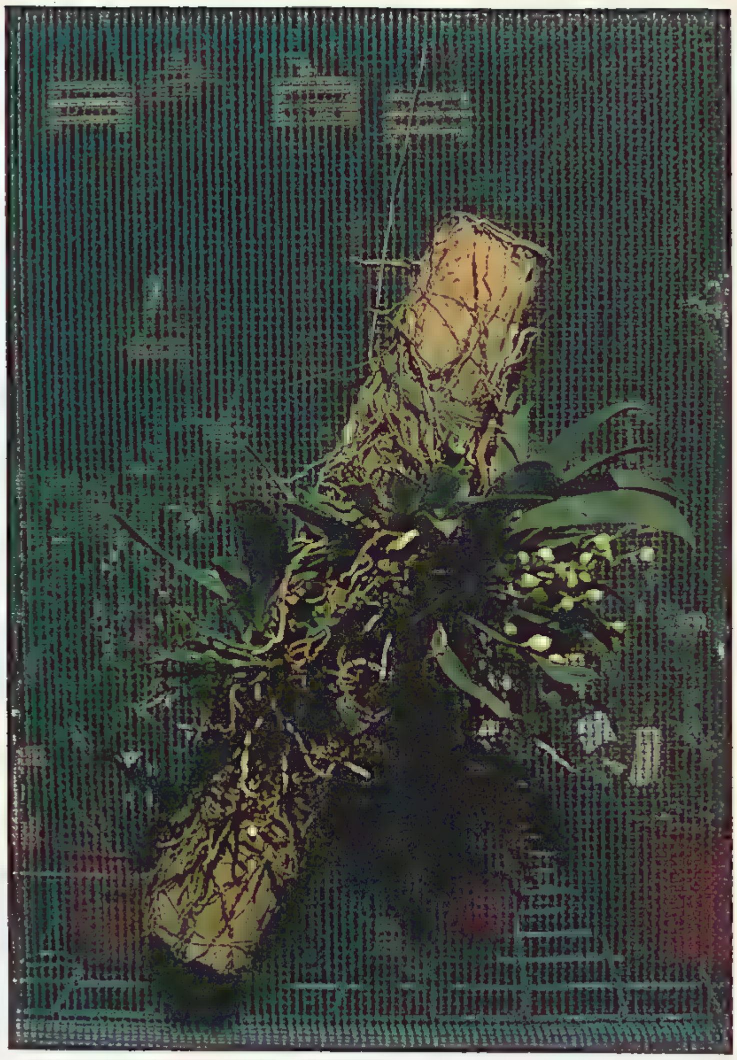
inert and not subject to insect, fungal or water induced decay. In fact, the only thing that affects it is ultra-violet radiation when, if exposed to these rays, the product fairly quickly breaks down. I now paint the ends with tree paint and no more problems. It has not proved toxic as I have had roots of *D. linguiforme* grow right through the foam. You can make it in any length; I have a *Peristeranthus hillii* on one where I used two sheets of paperbark.

The totems can be made in two ways. Roll up the paperbark into a tube so that the ends overlap on the long axis. Hold it in place with three or four elastic bands - not too tight. Put the tube horizontally on the bench on some newspaper and cover any blemishes in the paperbark with some bark scraps so that the foam will not ooze out. Make a small incision in the middle of the tube only large enough to accept the nozzle of the can. Inject the foam so that it fills the centre - be careful not to overdo it as it expands quickly. Some will flow out and form a blob at one or both ends of the tube. You can put a small cap of three or so layers of newspaper on one end held in place with an elastic band. Cut the blob(s) off or remove the cap when the foam has set according to the directions on the can. Seal the ends of your new totem with tree paint etc.

The second method varies only by wrapping the paperbark around a tube of gutter guard plastic mesh. Heavier orchids can be put on these mounts as the wire hook will not pull through the top as the mesh holds the wire in place.

Unless there is something about the foam that I have not considered, I think I have what, for me, fits the criteria of the perfect mount. It combines the longevity and versatility of the paperbark with the indestructibility of the expanded foam. The tables have been turned and the limiting factor will now be the life of the bark and the age of the orchid!

I know other growers have all sorts of mounts made out of all sorts of materials to meet all sorts of differing requirements; lengths of polystyrene glued and rolled in peat moss, fibro pipe sealed at one end and filled with water, terra-cotta pipes done the same way and no doubt many other constructions that would gladden the heart of a Heath Robinson. I have not tried these so I do not think it appropriate that I discuss their merits.



Above: Is this the perfect mount? A totem made from paperbark and foam with *Sarcochilus falcatus* growing extremely well on it.
[Editor's note: See rear cover for examples of other types of totems.]

What I have tried to do here is pass on some of the information I have learnt about mounts over the last dozen or so years, stimulate a bit of interest in exploring the culture of orchids on mounts and tell you a little about my own search for the perfect orchid mount. With my paperbark and foam I reckon I am pretty close to the "Holy Grail" on orchid totems. What do you think?

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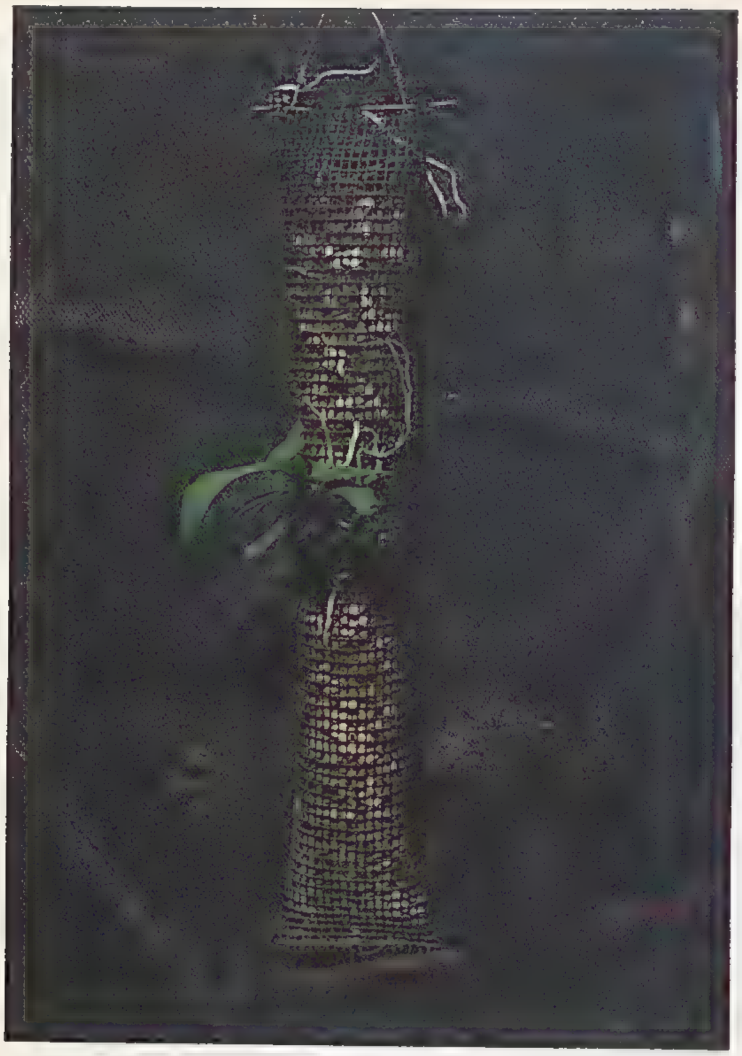
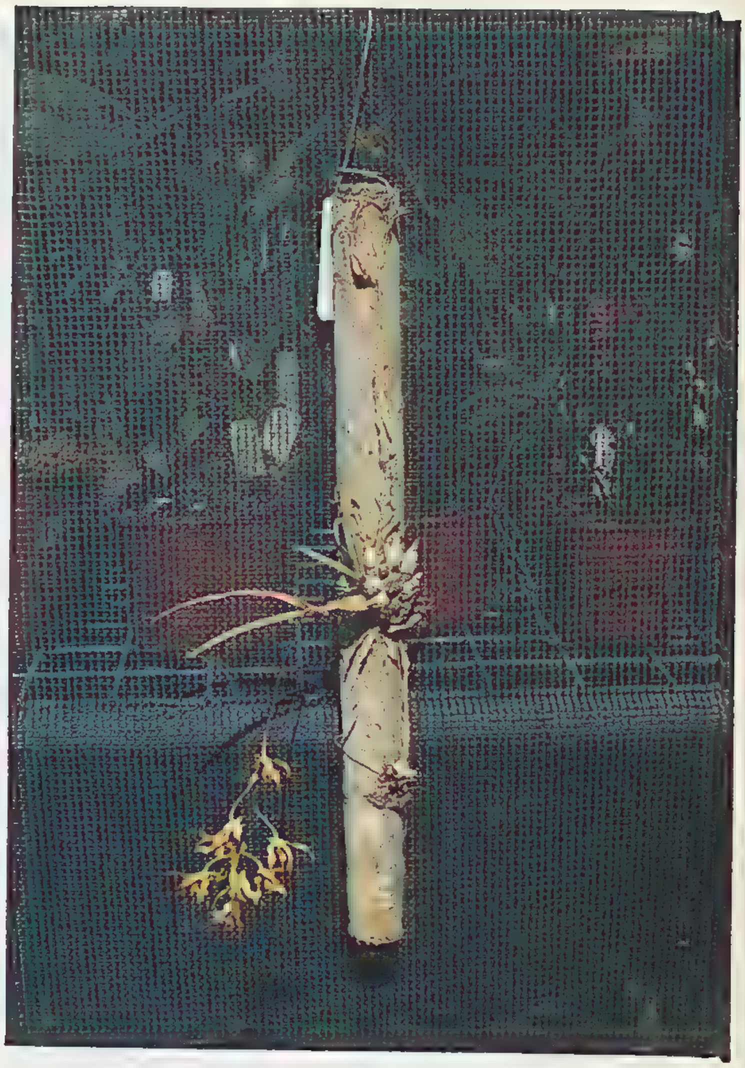
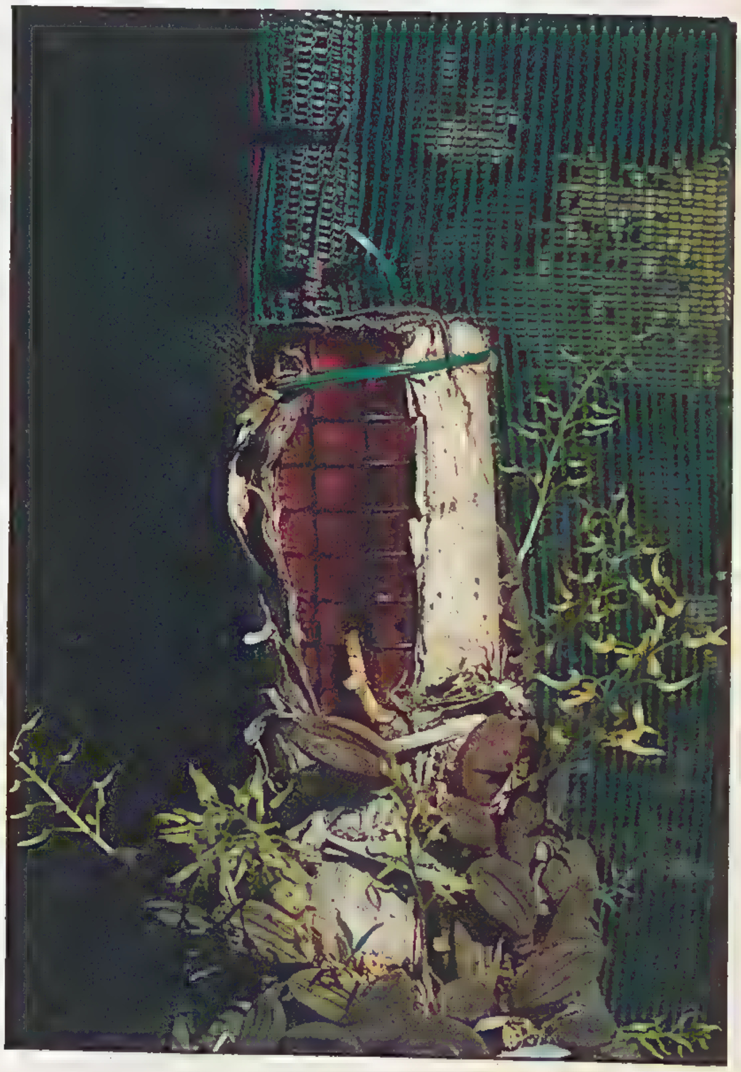




Examples of the various totems described in the article beginning on page 114.
Above: *Robiquetia wassellii* growing on a totem made from fine mesh gutter guard filled with a mix of bark and pebbles.
Top right: A paperbark and broom handle totem with *Dendrobium canaliculatum* var. *nigrescens*.
Bottom right: UV induced decay in a paperbark and foam totem with *Dendrobium linguiforme*.



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- from FitzGerald "Australian Orchids".
Rear cover: *Sarcochilus australis* (Lindley) H.G. Reichb.

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TALKING POINT

This issue contains two articles of interest to those readers with a preoccupation in the problem of naming Australian native orchids.

Both authors have approached their subjects with commendable prudence and careful deliberation. Definitive advice was obtained from researchers and teachers in plant taxonomy to ensure that their hypotheses on speciation were sound. Naturalists with a wide experience in the appearance, location, and habitat of native orchids contributed ideas and information to both papers.

Dr. Peter Adams is the author of *Variation, Multiple Pollinators and Breeding System in Dendrobium speciosum* Smith: *A Biological Review.* This thoughtful article reviews the distribution and variation found within plants of the *Dendrobium speciosum* complex, and presents much new information on pollination and breeding systems in *Dendrobium speciosum.* It then reassesses the taxonomic relationships of plants within the *Dendrobium speciosum* complex in the light of the known information.

Dr. Peter Lavarack presents a personal view in his article, *An Appraisal of the Species Concept in the Taxonomy of Australian Orchids.* This article will cause hobbyist readers to stop and think about the problems faced by taxonomists when they try to place plants into boxes representing different species. Perhaps Dr. Lavarack expresses the problem best with the words -

> *"Taxonomy is built on the species concept, but no one has yet satisfactorily defined that concept. The reason for this lack of definition is that "Nature" does not recognise species."*

No doubt these two articles will draw their critics. I make no apology if this happens. An objective of *The Orchadian* is to provide a forum for the presentation of well researched arguments based on the best current knowledge. Both articles have been closely examined for soundness of judgement and correctness of fact. They must now stand exposure to scientific and hobbyist readers alike. I hope that, when any criticism is published, the judgements made in those articles are subjected to the same degree of critical review as the original articles presented here in this issue. If those articles are presented for publication in *The Orchadian*, I can guarantee that the authors of those articles will be accorded the same fair, unbiased, critical review that was accorded to Dr. Lavarack and Dr. Adams.

Drawings by J.J. Riley

Many readers of *The Orchadian* draw or paint native orchids. One such person, John Riley, has made available a series of prints from some of his paintings to ANOS Council. These prints can be obtained from the ANOS Treasurer (see advertisement on centre page). The quality of these prints can be judged from the superb rendition of *Sarcochilus australis* on the back cover of this issue.

Noel J Grundon

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VARIATION, MULTIPLE POLLINATORS AND BREEDING SYSTEM IN *DENDROBIUM SPECIOSUM* SMITH: A BIOLOGICAL REVIEW

Dr Peter B. Adams
School of Botany, University of Melbourne, Grattan Street, Parkville, Vic. 3052.

SUMMARY: ***Dendrobium speciosum*** **Smith is a variable epiphyte or lithophyte occupying a wide range of habitats from eastern Victoria to the base of Cape York Peninsula. When all the known populations are considered, there is considerable variation in vegetative and floral features of the six varieties, with significant overlap of characteristics between most of these varieties, and geographical areas where intermediates between plants considered "typical" of most varieties are growing in close proximity. The varieties clearly intergrade in some areas, and it is not possible to construct a botanical key to classify all of the plants seen in the field. However, every plant of *D. speciosum* is almost instantaneously recognisable as belonging to that species.**

New information gathered over the past ten years is presented about pollinators, fragrance chemistry, and the breeding system. Multiple bee pollinators, mainly *Trigona* Jurine sp., have been observed in each of the four varieties studied so far, indicating a non-specific relationship between bees and varieties. The breeding system is the same for each variety, with a strong capacity for outbreeding, and a variable but lesser potential for self-pollination. Social bees are attracted by a mass display of spring flowering and strong fragrance under warm conditions. The fragrance chemistry of var. *speciosum*, var. *grandiflorum*, and var. *hillii* is almost identical in composition, and appears to represent a reward system for bees who use the chemicals in their social interactions. The morphological and biological studies of *D. speciosum* using plants from each of the geographical regions, supports the view that the species is a complex, best regarded as a system of varieties, which are each variable and may intergrade, especially at their limits of distribution. The following varietal names and authorities are recommended for *Dendrobium speciosum* taxa:

D. speciosum **Smith var. *speciosum***
D. speciosum **Smith var. *hillii* Masters**
D. speciosum **Smith var. *grandiflorum* F.M.Bail.**
D. speciosum **Smith var. *capricornicum* S.C.Clemesha**
D. speciosum **Smith var. *curvicaule* F.M.Bail.**
D. speciosum **Smith var. *pedunculatum* S.C.Clemesha**

INTRODUCTION

Dendrobium speciosum, described by Smith (1804) as the "great dendrobium", is still considered by many to be the most outstanding and variable Australian orchid. Its distribution and wide range of habitats from Victoria to Queensland are remarkable. It has defied attempts to fit its variability into specific taxa in a system acceptable to those who have observed it in all geographic regions. New knowledge is accumulating progressively as outlying populations are discovered and studied more closely.

Most of the written information on *D. speciosum* has focussed on morphological description and distribution, leading to proposed taxa to account for variation, as varieties (Clemesha 1981a, 1981b, 1982, 1986) or subspecies (Banks and Clemesha 1990). There has been considerable discussion following the proposal, offered without supporting evidence, to raise *D. speciosum* varieties to species status (Clements 1989). However, few studies have been reported on biological aspects such as pollination, breeding systems and ecology, since Fitzgerald (1891) commented on the huge investment in flowering, and small resultant numbers of seed capsules.

In this reassessment of the species, variation in floral and vegetative morphology is reviewed, together with information on distribution, pollinators, reproductive biology, and ecology. New information is presented on fertility, breeding systems, pollinators, and fragrance chemistry. The taxonomic system selected for this review is that outlined by Clemesha (1981a, 1981b) using varieties, which are critically considered in the light of all evidence presented.

REVIEW OF CURRENT AND NEW INFORMATION ON *DENDROBIUM SPECIOSUM*

Distribution

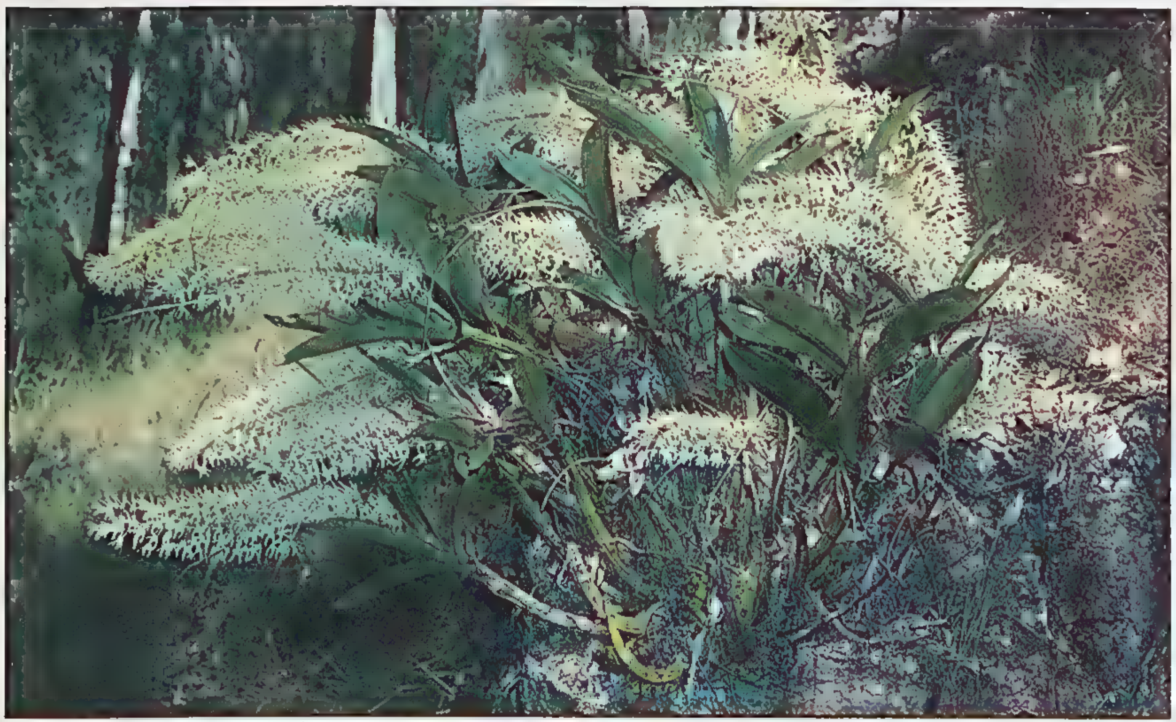
The limits of var. *speciosum* and var. *hillii* have been reasonably well defined, except for the northern limit of var. *hillii* in the area west of Brisbane where intermediate forms are found with var. *grandiflorum* (Table 1, Fig. 1). A general region from Caboolture to the Gladstone area, about 400 km apart, has been established for var. *grandiflorum*, but outlying populations are still being surveyed, and the range could be extended. For example, a short-caned population with floral affinities to var. *grandiflorum* has been found west of Toowoomba. The surveys are complicated by the difficulties of intermediate forms and atypical features in populations at the extreme limits.

Along the Tropic of Capricorn, some isolated and variable populations have been described under the title of var. *capricornicum* or subsp. *capricornicum* (Banks and Clemesha 1990) (Fig. 1; Table 1). A restricted coastal form occupies a small area in the Rockhampton area, while inland populations are found on the Blackdown Tableland (referred to as Blackdown Tableland form in Table 7) and at Carnarvon Gorge. These quite variable populations have some affinities to var. *grandiflorum*, and a typical form is difficult to describe.

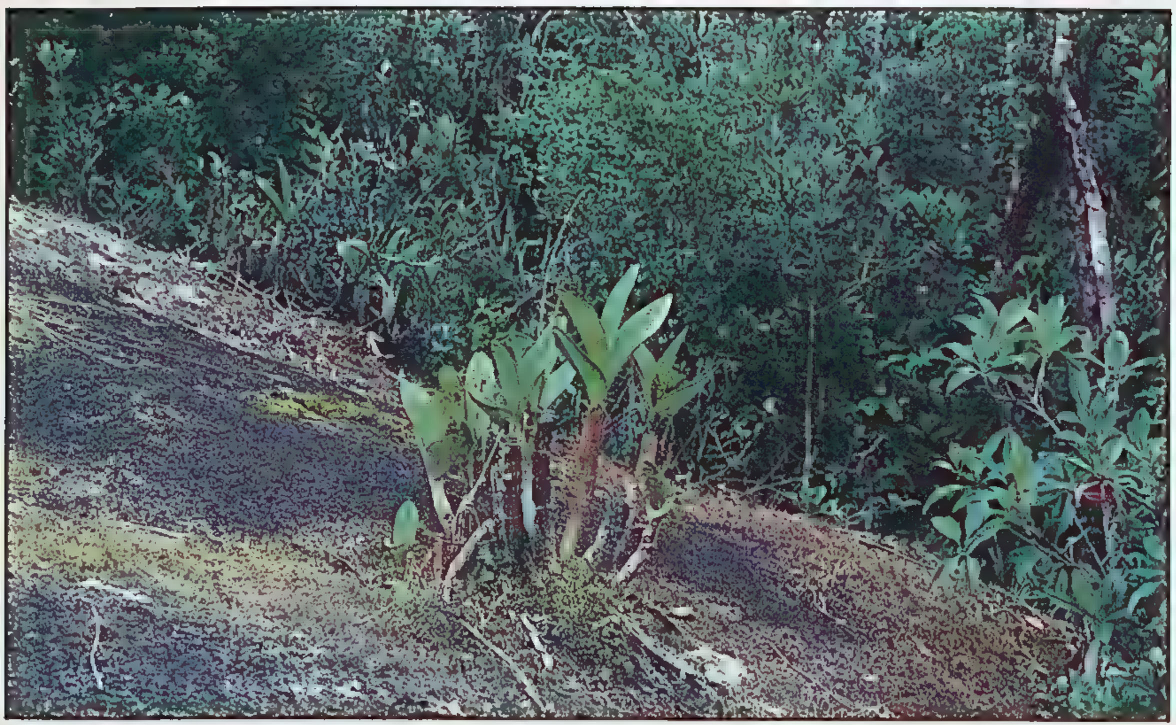
In North Queensland, the distribution ranges of var. *curvicaule* and var. *pedunculatum* overlap, and the limits have not been clearly defined (Fig. 1; Table 1). West of the Great Dividing Range, var. *pedunculatum*, var. *hillii* and var. *speciosum* occur as lithophytes in small isolated colonies.

Growth Habit

All varieties occur as lithophytes, while var. *hillii*, var. *grandiflorum*, var. *speciosum*, and var. *curvicaule* may also occur as epiphytes (Table 2). In the same area, var. *hillii* may commonly form huge clumps as an epiphyte on trees in, or at the edge of, rainforests, and occur as a lithophyte on rocky outcrops. Aerial roots are common in



***Dendrobium speciosum* var. *hillii*.** Creek-side lithophyte from northern part of range, Qld. Photo. P. Adams.



***Dendrobium speciosum* var. *curvicaule*.** Lithophyte on exposed peak, Mt. Lewis, Qld. Photo. P. Adams.

var. *hillii* and var. *grandiflorum*, but occur occasionally in var. *speciosum*, var. *pedunculatum* and var. *curvicaule* (Table 2). Growth habit and the presence of aerial roots are not reliable characters in the differentiation of taxonomic groups.

Variability of Floral and Vegetative Features

When the six varieties are critically examined by comparing the features of all known populations, it is immediately obvious that many characteristics vary widely (Table 3). Specific details of plant habit and floral details of plants typical of the varieties can be found in Clemesha (1981a, 1981b) and Banks and Clemesha (1990). Variation within varieties is easily seen in the examples presented in Clemesha's original review (Clemesha 1981a), and is even more noticeable in the field. In Victoria, var. *speciosum* occurs only as a lithophyte, often as a flattened, urn-shaped plant with strongly curved pseudobulbs of a bright yellow colour, supporting short flower spikes with 8-30 flowers, but often with less than 20 flowers. The flowers have a heavy texture, and the labellum may be relatively small, variably marked and incurved, resembling that of var. *hillii*. This form differs markedly from that of var. *speciosum* north of Sydney, where canes are generally taller, flower spikes longer with up to 60 flowers per spike, and flowers larger with a much broader labellum. In the rainforests of Clyde Mountain and the Illawarra district, var. *speciosum* may show

Captions for colour plates opposite:

Top left: *Dendrobium speciosum* var. *speciosum*. Large white form, Newcastle area, NSW. Photo. P. Adams.

Top right: *Dendrobium speciosum* var. *speciosum*. Red-spotted form. Photo. L. Barton.

Middle left: *Dendrobium speciosum* var. *hillii*. Exceptionally large and fine form with features intermediate between var. *hillii* and var. *speciosum*, Mt. Seaview, NSW. Photo. P. Adams.

Middle right: *Dendrobium speciosum* var. *hillii*. Typical small-flowered form, Stanthorpe, Qld. Photo. P. Adams.

Lower left: *Dendrobium speciosum* var. *capricornicum*. Mt. Hedlow, Qld. Photo. L. Barton.

Lower right: *Dendrobium speciosum* var. *pedunculatum*. Brush-type inflorescence, Atherton, Qld. Photo. P. Adams.

Table 1. Distribution of *Dendrobium speciosum*.

Variety	Knowledge of distribution	Reference
speciosum Vic., NSW	Limits reasonably well established; Cann R. (S) - Mt. Alum, Munghorn Gap (N)	Dockrill (1969); Banks and Clemesha (1990)
hillii NSW, Qld	Limits reasonably well established except at northern limit; Peats Ridge, Barrington Tops (S) - Brisbane area (N)	Dockrill (1969); Gregory (1980, 1988); Banks and Clemesha (1990)
grandiflorum Qld	General region defined but range may still be extended as surveys continue; Caboolture, Bunya Mtns (S) - Mt. Larcom, Gladstone (N)	Dockrill (1969); Banks and Clemesha (1990)
capricornicum Qld	Coastal form (typical) restricted, defined and at risk of depletion; Rockhampton area. Inland forms; Blackdown Tableland and Carnarvon Gorge (W)	Banks and Clemesha (1990)
curvicaule N Qld	Limits not well defined; Connors Range (S) - Mt. Amos near Cooktown (N); overlaps with var *pedunculatum* (N)	Banks and Clemesha (1990)
pedunculatum N Qld	Western slopes of Evelyn, Atherton and Windsor Tablelands	Dockrill (1969); Banks and Clemesha (1990)

Captions for colour plates opposite:
Top left: *Dendrobium speciosum* var. *curvicaule.* Broad floral segments, Mt. Lewis, Qld. Photo. L. Barton.
Top right: *Dendrobium speciosum* var. *curvicaule.* Narrow, long floral segments, Mt. Lewis, Qld. Photo. L. Barton.
Middle left: *Dendrobium speciosum* var. *grandiflorum.* Large flowers and tightly packed large inflorescence, Gallangowan, Qld. Photo. P. Adams.
Middle right: *Dendrobium speciosum* var. *grandiflorum.* Large flowered form with narrow floral segments, Gallangowan, Qld. Photo. P. Adams.
Lower left: *Dendrobium speciosum* var. *grandiflorum.* Small flowers and open small inflorescence. Photo. P. Adams.
Lower right: *Dendrobium speciosum* var. *grandiflorum.* Gold form with broad floral segments, Mt. Binga, Qld. Photo. L. Barton.

epiphytic as well as lithophytic growth habit (Clemesha 1981a).

The typical plant of var. *hillii* has tall, fairly straight and gently tapering pseudobulbs. The inflorescence is a long "fox tail" with crowded, small flowers, more numerous than in other varieties. The labellum is small with few markings. Clemesha (1981a) considered that var *hillii* displayed little variation over its range, but some outlying populations have now been found to be very different from the type described above. Near Tenterfield at the western limit, the canes are only about 15 cm in height, and are very distinctly tapered, making them almost indistinguishable vegetatively from var. *speciosum.* However, the white flowers are typical of var. *hillii* except for a much reduced number per spike, about 20-40. At another site in this area, only 20 km distant, I have seen plants with the same short type of pseudobulb, but the flowers, about 20-30 per spike, were intense yellow, much larger, and of significantly greater horticultural merit.

There is great variation in flower number, quality, size, labellum shape and marking, and in plant habit of var. *grandiflorum* when a number of populations are compared from the Bunya Mountains in the south to Mt. Larcom in the north, where some exceptionally floriferous plants with large flowers have been found. Some authors have erroneously concluded that var. *grandiflorum* is usually of superior floral quality, a result of examining too few populations and individual plants.

The range of variability of var. *pedunculatum* and var. *curvicaule* is just as marked, with many plants unrecognisable as typical for the variety. In addition, there are plants that have intermediate features between the two, and that cannot be assigned to either. For example, in populations of plants otherwise typical of var. *pedunculatum,* some plants will have very short peduncles which occupy less than one quarter of the total inflorescence length, while others have peduncles occupying one third to one half of the length of the inflorescence. Some plants have densely packed "brushes" of small, poorly opening flowers with narrow segments, while others have only 8 or 10 flowers opening fully, and are of very superior form. Cane length varies from stumpy (less than 8 cm) to short or medium (30 cm), intergrading with that of var. *curvicaule.*

The inland populations at Carnarvon Gorge and Blackdown Tableland, sometimes placed in var. *capricornicum,* are extremely variable, and have been referred to as "forms" in Table 3 and Table 7. They are related to the typical (coastal) form of var. *capricornicum,* but are worthy of further population studies, including morphometrics, to clarify their relationships, and also their resemblance to var. *grandiflorum* (Clemesha 1981a).

Overall, floral size, shape, colour and morphology of floral parts, vary greatly within and between the varieties (see colour plates). Red-spotting and streaking are occasionally found in the flowers of some varieties, including var. *speciosum* and var. *curvicaule* (Banks and Clemesha 1990; Batchelor 1991; Wirth 1991).

Table 2. Growth habit in *Dendrobium speciosum.*

Variety	Epiphyte	Lithophyte	Aerial Roots
speciosum	Rarely	Yes	Yes/No
hillii	Yes	Yes	Yes/No
grandiflorum	Yes	Yes	Yes/No
capricornicum	No	Yes	No
curvicaule	Yes	Yes	Yes/No
pedunculatum	Rarely	Yes	Yes/No

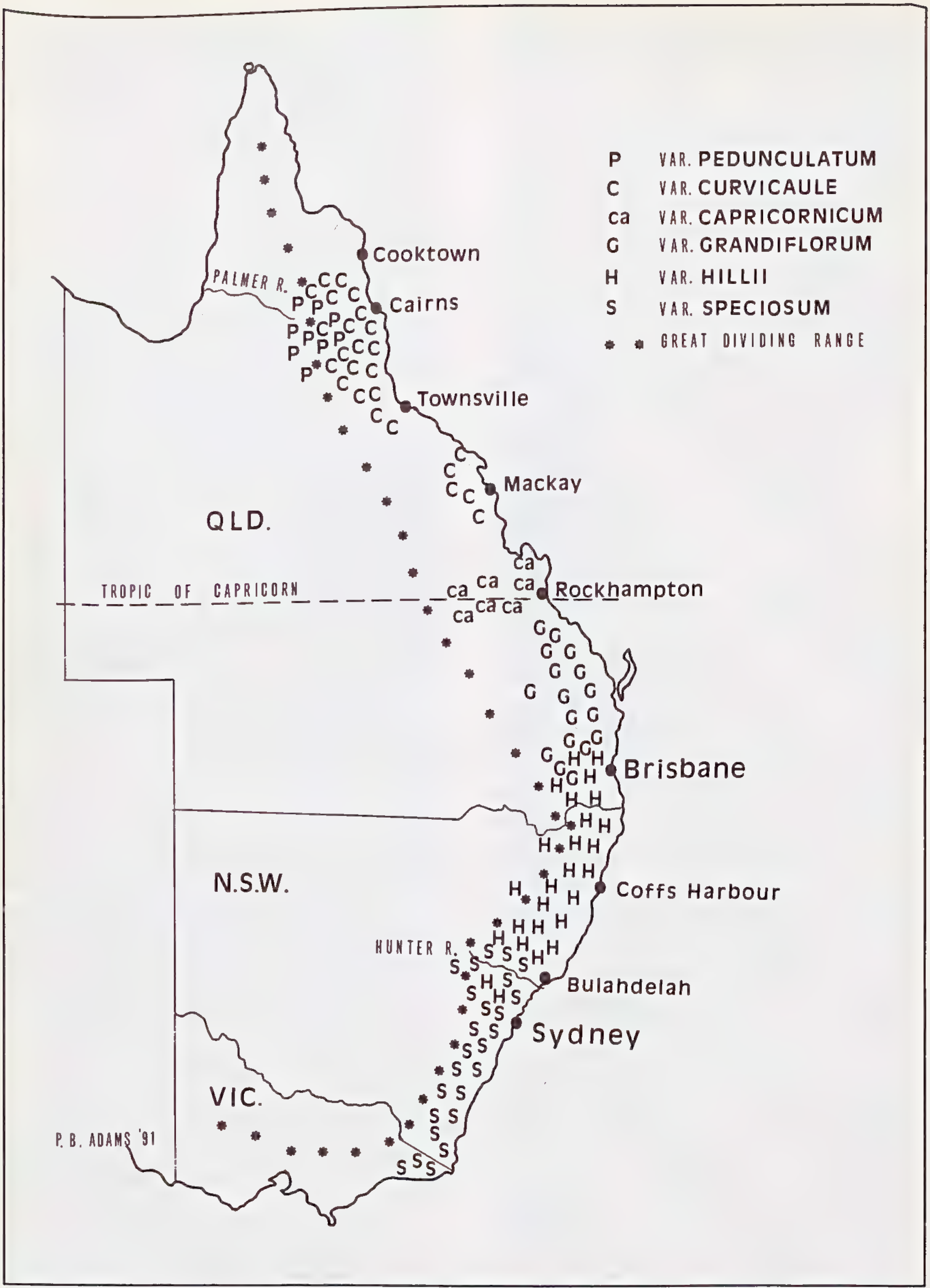


Figure 1. Distribution of the varieties of *Dendrobium speciosum* Smith (updated from Clemesha 1981).

Table 3. Variability within and overlap between varieties in size and morphology of pseudobulbs and flowers in *Dendrobium speciosum.*

Variety	Pseudobulbs		Flowers		Intermediate forms with:
	Variability	Overlaps with:	Variability	Overlaps with:	
1. *speciosum*	Variable	2, 3	Variable	2	2
2. *hillii*	Variable	1, 3	Variable	1, 3	1, 3
3. *grandiflorum*	Variable	1, 2, 4, 5	Very variable	2, 4, 5	2
4. *capricornicum* (coastal form)	Variable	3, 5, 7	Variable	3, 5, 7	-
5. *capricornicum* (Blackdown Tableland & Carnarvon Gorge forms)	Very variable	3, 4, 7	Very variable	3, 4, 7	-
6. *curvicaule*	Very variable	7	Variable	7	7
7. *pedunculatum*	Variable	4, 5, 6	Variable	4, 5, 6	6

Table 4. Self pollination studies with *Dendrobium speciosum*, 1990 season, Melbourne.

Variety	No. flowers pollinated[1]	No. capsules matured	% flowers converted to capsules
speciosum	22	0	0
hillii	24	0	0
grandiflorum	18	6	33
pedunculatum	10	4	40

[1] Values are total number of flowers pollinated on 3 or 4 different plants of each variety.

Breeding Systems

The breeding system of *D. speciosum* has been studied by making experimental self- and cross-pollinations using plants in the natural habitat, and in research collections under a variety of climatic conditions over the past ten years. Results were assessed by recording the number of seed pods developing to maturity and liberating viable seed, as determined by viability tests, aseptic culture or simple microscopy. Plants with intermediate characteristics not easily assigned to a typical variety were not used in these studies.

It is not possible to make reliable conclusions about fertility and breeding systems of particular plants or populations unless experiments are performed over a number of flowering seasons. Results, particularly of self-pollinations, may vary widely depending on particular plants used and climatic conditions, especially temperature, in the 9-12 weeks between pollination and maturity of seed capsules.

In Victoria, in both natural populations and in shadehouse collections, var. *speciosum* failed to initiate pod development after self-pollination under a variety of conditions over five flowering seasons (Calder *et al.* 1982) (Table 4). Similar results have been found when var. *hillii* was self-pollinated in Victorian collections. There are two reports (L. Irwin, P. Nash, pers. comm.) of isolated plants of var. *hillii* setting a seed capsule in Melbourne suburbs, and producing seedlings with var. *hillii* habit. In var. *grandiflorum* and var. *pedunculatum*, a variable percentage of capsules develop to maturity with viable seed if conditions in the post-pollination period are consistently warm, as they were in the flowering season of 1990. If temperatures are cooler, self-pollinations in these two varieties are usually unsuccessful.

The results of experimental self-pollinations in New South Wales and Queensland are similarly

Table 5. Outcrossing pollination studies with *Dendrobium speciosum*, 1990 season, Melbourne.

Varietal parentage	No. flowers pollinated[1]	No. capsules matured	% flowers converted to capsules
speciosum 'A' x *speciosum* 'B'[2]	18	16	89
hillii 'A' x *hillii* 'B'[2]	13	12	92
grandiflorum 'A' x *grandiflorum* 'B'[2]	14	14	100
pedunculatum 'A' x *pedunculatum* 'B'[2]	12	12	100
speciosum x *hillii*	16	15	94
speciosum x *grandiflorum*	40	38	95
speciosum x *pedunculatum*	20	18	90
hillii x *grandiflorum*	16	14	88
hillii x *pedunculatum*	12	12	100
grandiflorum x *pedunculatum*	15	15	100

[1] Half the flowers for each plant used as pod and pollen parents.
[2] Plant 'A' and Plant 'B' are different genotypes.

related to temperature, with the exception that self-pollinations are usually successful in var. *hillii* and var. *speciosum* under warm but not cold conditions. Furthermore, self-pollinations with var. *grandiflorum* and var. *pedunculatum* are more successful than those carried out in Victoria (Table 6). In different locations in New South Wales and Queensland, var. *curvicaule* and var. *capricornicum* may be successfully self-pollinated during some flowering seasons, but not others. In plants of all varieties, the results of self-pollination, whether autogamous (pollination within the one flower), or geitonogamous (between flowers on the same plant) are the same.

All varieties of *D. speciosum* are strong outbreeders in cross pollinations between genetically different plants of the same variety, in inter-varietal cross pollinations, and in cross pollination with other *Dendrobium* species, particularly within the Section *Dendrocoryne* (Table 5). The rate of successful pollinations is within the range 90% - 100%, even in cooler Victorian conditions. Occasional plants of all varieties may be infertile, for reasons that are not understood.

The data on fertility and breeding systems were compiled from many experiments in New South Wales, Queensland and Victoria over several flowering seasons. The results indicate a similar breeding system operates in most plants of all varieties studied, irrespective of place of experimentation and climatic conditions, with the exception of results for self-pollination, which is temperature dependant. All varieties are strongly outbreeding with a lesser potential for self-pollination, especially in the two southernmost varieties.

Capacity to Develop Mature Seed Capsules

The natural set of seed varies widely in different seasons, from an occasional capsule to large numbers per plant (Gregory 1980). In Victorian colonies, there is an average conversion of flowers to seed capsules of about ten per cent (Adams and Calder 1982).

Experiments in which inflorescences were loaded with various numbers of seed pods indicate that there is a limit to the number of capsules that develop to maturity (Adams 1989). In var. *speciosum* and var. *hillii*, a maximum of about eight capsules matured when 8, 16 or 32 flowers on one inflorescence were cross pollinated. This result indicates a balance between resources invested in vegetative effort (growth) and in seed production. The capacity of northern varieties to produce seed is currently being investigated.

Observations of Pollination

Pollination events on the flowers of *D. specio-*

Table 6. Summary of pollination studies with *Dendrobium speciosum* over several flowering seasons.

Variety	Capsules formed in self-pollinations		Capsules formed in cross pollinations with all other varieties (All states)	Capsules formed in cross pollinations with other *Dendrobium* species (All states)
	In Vic.	In Qld, NSW		
speciosum	No	Yes/No[1]	Yes	Yes
hillii	No	Yes/No	Yes	Yes
grandiflorum	Yes/No	Yes/No	Yes	Yes
capricornicum	NT[2]	Yes/No	Yes	Yes
curvicaule	NT[2]	Yes/No	Yes	Yes
pedunculatum	Yes/No	Yes/No	Yes	Yes

[1] Yes/No means mature capsules formed under warm post-pollination conditions, but no capsules formed in cool post-pollination conditions.
[2] NT means not tested.

sum have rarely been described. In fact, no report to date has adequately outlined the complete sequence required for confirmed pollinator status as suggested by Adams and Lawson (1988). Some observers have confused floral visitation with pollination, claiming pollination by insects with insufficient supporting evidence. Smythe (1970) and Jones (1983) have accredited pollination to native bees of the genus *Trigona* Jurine, but without providing descriptive evidence. The pollination reports that follow are evaluated in Table 7, according to criteria for pollinator status (Adams and Lawson 1988; Adams 1990a).

***D. speciosum* var. *speciosum*:** Repeated attempts by our team to observe pollination over five seasons in Victorian colonies of *D. speciosum* var. *speciosum* have been unsuccessful. A *Syrphus* hover fly which has often been observed picking up pollinia from various dendrobiums in collections, including *D. speciosum*, was active in visiting the flowers of these colonies, but never picked up pollinia. The common honey bee occasionally took up pollinia, but more often knocked pollinia off the flowers, or damaged them in a way that would reduce the chance of pollination. Honey bees occasionally carry out pollination on flowers with a large open labellum, but must be regarded at most as a recent immigrant and inefficient pollinator. Set of seed capsules is relatively efficient in Victorian and southern New South Wales plants (Adams and Calder 1982), and semi-social and solitary bees of the *Halictidae* and *Colletidae* families have been suggested as pollinators (K. Walker, Museum of Victoria, pers. comm.)

***D. speciosum* var. *hillii*:** No evidence is available for Fitzgerald's early suggestion that the resident Dendrobium beetle, *Stethopactus formosa*, is a pollinator. Slater surveyed the insect visitors to var. *hillii* in South-east Queensland (Slater and Calder 1988) and found the semi-social bee, *Homalictus brisbanensis*, took up pollinia and was active in visiting flowers. Three other bee genera, *Trigona*, *Lasioglossum* and *Hylaeus*, were frequent visitors and were considered likely to be pollinators.

In new studies in recent flowering seasons, members of our pollinator survey team have observed numerous complete and partial sequences of pollination events on var. *hillii* in the Stroud, Dorrigo and Cloud Creek areas of New South Wales. A small black native *Trigona* bee visits flowers actively during clear sunny weather conditions, picks up pollinia on the dorsal surface of its thorax, flies to a flower on the same or another plant, usually within several metres, and deposits pollinia on the stigmatic surface. These bees are extremely efficient at taking up pollinia, and have been seen to carry up to four or five pollinia, increasing the likelihood that pollen deposition will occur at ensuing floral visits. *Trigona* is a confirmed pollinator of var. *hillii*. *Homalictus* is very

Table 7. Pollinators of *Dendrobium speciosum.*

Variety	Confirmed pollinators	Probable pollinators	Suggested pollinators	Minimum number of pollinators	Reference
speciosum	NR[1]	*Apis mellifera*	Unidentified solitary native bee	2	Adams & Calder (1982) Adams (this study)
hillii	*Trigona* sp. 1 (NSW)	*Trigona* sp. 1 (Qld) *Lasioglossum* sp. (Qld) *Hylaeus* sp. (Qld) *Homalictus brisbanensis* (Qld, NSW)	NR	5	Slater & Calder (1982) Adams (this study)
grandiflorum	NR	*Trigona* sp. 1	*Trigona* sp. 2	2	Adams (this study)
capricornicum (coastal form)	NR	NR	NR	NR	
capricornicum (Blackdown Tableland form)	*Trigona* sp. 1 *Trigona* sp. 3	*Apis mellifera*	NR	3	Adams (this study)
curvicaule	NR	NR	NR	NR	
pedunculatum	NR	*Trigona* sp. 4 *Trigona* sp. 5	NR	2	Adams (this study)

[1] NR means none recorded to date.

probably a pollinator, and at least two other genera, *Lasioglossum* and *Hylaeus*, are likely pollinators.

***D. speciosum* var. *grandiflorum*:** In new observations, two apparently different *Trigona* species with different banding patterns and size, have been observed visiting plants in the Maryborough (Queensland) area, and picking up pollinia from flowers. The darker species, closely resembling *Trigona* which pollinate var. *hillii*, transferred pollinia to other *D. speciosum* flowers, and are therefore regarded as confirmed pollinators. The lighter coloured species were only seen to pick up pollen, and are probable pollinators. There are many species of *Trigona* in New South Wales and Queensland, but unfortunately their taxonomy has yet to be clarified at species level.

***Dendrobium speciosum* var. *capricornicum* Blackdown Tableland form:** New studies on this extremely variable form have been completed recently. Two apparently different species of *Trigona*, one black and very similar to the bees which appear to pollinate var. *hillii* and var. *grandiflorum*, were seen to visit flowers of short stubby plants, take up pollinia and transfer them to a second flower. A small variant of *Apis mellifera* was active in picking up pollinia, but was not observed to deposit them on the stigma of a second flower over a brief period of time. It may be regarded as a probable pollinator.

***D. speciosum* var. *pedunculatum*:** In the Mt. Molloy area, two apparently different bee species considered to be *Trigona*, have been seen visiting colonies, probing flowers deeply, and picking up pollinia on their thorax. A black and a yellow-banded species transferred pollinia to flowers within several metres.

***D. speciosum* var. *curvicaule* and var. *capricornicum* (coastal):** No reports of observations of pollination events have appeared to date in these two species.

Table 8. Compounds identified in the fragrance of three varieties of *Dendrobium speciosum.*

Chemical	var. *speciosum*	var. *hillii*	var. *grandiflorum*
1,4-dimethoxy benzene	++[1]	++	++
Benzene methanol or benzene ethanol	+[2]	++	++
Methyl ester of benzene acetic acid	-[3]	+	+

[1]++ means major component; [2]+ means minor component; [3]- means not reported.

Intermediate Forms Between Populations Described as Varieties or Forms

The presence and general location of plants intermediate in characteristics between those regarded as typical of varieties or subspecies have been recorded in some reviews of the species (Banks and Clemesha 1990; Gregory 1980, 1988), but the significance of this information has not been discussed and incorporated into an understanding of the variation of the *D. speciosum* complex. In some accounts, the intermediates have been ignored altogether. Many reliable observers have noted the presence of intermediates between var. *pedunculatum* and var. *curvicaule* in north Queensland, between var. *speciosum* and var. *hillii* in the mid coast region of New South Wales, and between var. *hillii* and var. *grandiflorum* in South-east Queensland. In some areas, for example in Elgin Vale State Forest, plants typical of var. *hillii* and var. *grandiflorum* are growing within 50 m of each other, with intermediate plants in the same area.

The populations of *D. speciosum* var. *capricornicum* which grow along the Tropic of Capricorn (Table 1, Fig. 1) can be divided into three geographically distinct groups, a coastal group, and two inland groups at Blackdown Tableland and Carnarvon Gorge (Table 3). Nevertheless, each group contains within it plants that resemble those typical of the other two groups. Furthermore, Banks and Clemesha (1990) considered that the Blackdown Tableland form has ancestral links with var. *grandiflorum* which is also apparently geographically distinct from these three groups (Fig. 1). More detailed studies of these populations are required before their relationships can be understood. Perhaps the current disjunct distribution can be best understood as representing what remains from a previously more widespread and interconnected distribution.

Fragrance Biochemistry

The intensity of fragrance released by all varieties of *D. speciosum* at temperatures above 20 °C has been appreciated for many years. Holman and Adams (Adams 1988) have identified the key chemical components by mass spectroscopy as aromatic (benzene) derivatives, terpenes (essential oils), and esters of short-chain fatty acids (Table 8). Detailed collections have now been made from plants considered to be typical of each of the varieties. When var. *speciosum*, var. *hillii* and var. *grandiflorum* are compared, the compounds and relative abundance of each are the same for major fragrance components, with small differences in the minor components (Table 8). Results for other varieties are to be published shortly.

Genetics

No basic research on the genetics of the varieties of *D. speciosum* seems to have been undertaken.

Ecology

Only a small amount of published information is available on the ecology of the varieties of *D. speciosum.* Adams and Lawson (1984) reported that *D. speciosum* var. *speciosum* regenerated from dormant basal eyes after being burnt to the rocks during the Ash Wednesday bushfires in March 1983. Mature canes were formed and flowered for the first time in 1988. In New South Wales and Queensland, var. *hillii* and var. *grandiflorum* regenerate in similar fashion, whether growing as lithophytes or epiphytes. There are verbal reports of var. *capricornicum* being completely destroyed by frequent fires every two or three years in the Berserker Range near Rockhampton. North of Townsville, *D. speciosum* growing in *Drynaria* fern clumps experiences intense prolonged burning, and is often completely destroyed (B. Gray, L. Barton pers. comm.) A small number of long term studies are under way in Victorian and New South Wales populations, but have not yet been published. In eastern Victoria, the growth, flowering, capsule and seedling production of small colonies have been followed over a ten year period (Adams 1990a).

Conservation Status

In most areas of the distribution range, *D. speciosum* has suffered significant depletion due to various human activities, especially routine burning and collection, and also as a result of bushfires set off by lightning strikes. In some areas, such as Cann River in Victoria, it is locally extinct; in others, where populations were once extensive, for example around Sydney, it is now uncommon. Around Rockhampton, var. *capricornicum* is regarded as under serious threat, mainly because the area involved was never large. A small area near Maryborough, once rich in var. *grandiflorum*, has been completely cleared. There are many other areas where this scale of destruction is likely to be repeated.

DISCUSSION

Pollination, Breeding System and Fragrance Chemistry

Reports of pollination by native bees have been carefully considered and classified into "confirmed", "probable" and "suggested" categories using the criteria proposed by Adams and Lawson (1988) and Adams (1990a) (Table 7). The use of strict classification criteria for successful pollinator status is most necessary, because many reports of pollination events have been incomplete or poorly described, with confusion between flower visitation and pollination.

Native bees of the genus *Trigona* are confirmed pollinators of var. *hillii* and var. *capricornicum* Blackdown Tableland form, and are probable pollinators of var. *grandiflorum* and var. *pedunculatum.* Species of native bee from the genera *Homalictus, Lasioglossum* and *Hylaeus* are probable pollinators of *D. speciosum* in all of the regions studied in New South Wales and Queensland. Multiple pollinators probably operate in colonies of var. *grandiflorum*, var. *capricornicum*, var. *hillii* and var. *pedunculatum*, indicating a nonspecificity in the relationship between orchid and insect. This is not surprising considering these varieties offer the same fragrance chemical attractants (Table 8), and similar light-coloured mass display typical of the bee pollination syndrome (see colour plates).

As the number of observations increase, confirmed pollination of epiphytic orchids by two or more insects is becoming more evident, as found in *D. kingianum* (Adams and Lawson 1988) and *Liparis reflexa* (Akam, 1990; Adams 1990b). The search for pollinators is still at an early stage, and reports of single pollinators cannot be interpreted as representing a specific insect-orchid relationship until extensive efforts have been made and proved unsuccessful in finding other pollinators. It is possible that four or more *Trigona* species are involved in pollinating *D. speciosum*, and a detailed taxonomic study of *Trigona* is required to establish the species and their distribution. The genus *Trigona* is found from the Newcastle area north to the tip of Cape York and beyond, and is estimated to include at least fifteen different species. *Trigona* is, at this stage of the search, the most important epiphyte pollinator in Australian dendrobiums, with confirmed and probable pollinator status in the varieties of *D. speciosum*, and in *D. kingianum, D. X delicatum* (Adams 1990a), *D. lichenastrum* (Jones and Gray 1976), and *D. monophyllum* (Bartareau pers. comm.).

The rewards offered by *D. speciosum* to visiting bees have been a problem for pollination biologists. The flowers are considered not to offer a nectar, pollen or other reward, leading to the interpretation that the bees are deceived into repeated visits resulting in pollination. Recent analysis of floral fragrance of *D. speciosum* and *D. kingianum* reveals that flower probing, labellar grazing, and manipulative activities of bees on floral parts are very likely to represent gathering of fragrance chemicals for use in their social and reproductive interactions. Some of the major fragrance chemicals emitted by *D. speciosum* and *D. kingianum* are known to be produced, collected, stored, and used as trail pheromones in the communication of social and semi-social bees (Free 1987; Harborne 1977). The insects have highly developed behaviours achieving successful foraging, and learn to avoid apparent food sources that offer no rewards. The report of pollination by deceit of *D. speciosum* (Slater and Calder 1988) requires reinterpretation in the light of the new findings of fragrance chemistry. The use of the term deceit may reflect an incomplete understanding of insect-orchid interactions.

The breeding system of *D. speciosum* has been studied in several areas in each state over many years, and is essentially the same in each of the major varieties studied so far. *Dendrobium speciosum* is a strongly out-breeding orchid with relatively low seed capsule development to maturity. However, each capsule contains several hundred thousand seeds, creating the opportunity for massive seedling germination if conditions are suitable following each flowering season. Self-pollination is likely to be successful, especially in northern varieties, providing temperatures in the post pollination period are suitably high. Self-incompatibility can be overcome by increases in temperature. In nature, pollination visits are apparently very infrequent, and self-pollinations may be infertile, resulting in low set of seed capsules. Where many flowers are cross pollinated, each plant has a limit to capsule development up to maturity, and many pods may be dropped before maturity.

Natural Hybrids

In some geographical regions, outcrossing of *D. speciosum* extends to involve several other members of the Section *Dendrocoryne* resulting in the natural hybrids *D. X delicatum* (*D. speciosum* x *D. kingianum*), *D. X gracillimum* (*D. speciosum* x *D. gracilicaule*), *D. X ruppiosum* (*D. speciosum* x *D. jonesii* [syn. *D. ruppianum*]), and *D. speciosum* x *D. falcorostrum.* Hybrids are relatively uncommon, except where parent species grow close together in large numbers. Some plants of *D. X delicatum* and *D. X gracillimum* are fertile, and in experimental pollinations are strongly outbreeding similar to *D. speciosum* (Adams 1990a). Other plants of these natural hybrids are usually infertile in hand pollinations. They do not appear to build up large populations from seed under natural conditions over the distribution range of their parent species. In some areas, backcrossing of *D. X delicatum* and *D. X gracillimum* to parent species has created hybrid swarms, in which the parentage of individual plants may be extremely difficult to determine.

In summary, the available biological information supports the view that the reproductive mechanism is the same for populations of *D. speciosum* in each of its major geographical regions.

Approach to Nomenclature in View of Morphological Variation

Floral and vegetative features were described in detail by Clemesha (1981a, 1981b, 1982, 1986) when he established varietal status for var. *speciosum*, var. *hillii*, var. *grandiflorum*, var. *pedunculatum*, var. *curvicaule* and var. *capricornicum.* Features of so-called "distinct" taxa have also been briefly described in other articles and books, almost universally without discussion of the range of variation and intergradation of varieties. Some descriptions of variation have been offered recently by Gregory (1988), and also by Banks and Clemesha (1990) in proposing subspecies status for the varieties listed above. None of the taxonomic approaches to date has offered a botanical key that could be used to classify any given plant into proposed taxa, primarily because variation is too great, and the differences too small to create a successful key to identify all plants.

Examples of the variation to be found in size of pseudobulbs and flowers within varieties is described earlier in the review, and is listed in Table 3, indicating many areas of overlap within and between varieties and forms. These data were prepared from observations of thousands of plants in the field, plants in collections from known localities, and discussions with many of the persons listed in the acknowledgments of this paper. It is an overview of the variability within geographical regions. The table also lists intermediate forms which occur where var. *hillii* and var. *speciosum* meet in the distribution range in New South Wales, and where var. *hillii* and var. *grandiflorum* meet in the area west of Brisbane. Likewise, in north Queensland, intermediate forms are found admixed in populations of var. *pedunculatum* and var. *curvicaule* (Banks and Clemesha 1990), which themselves contain considerable variation and many atypical plants. The relationship between these two varieties is uncertain, and an alternative argument could be made for considering them as a single highly variable entity. Some taxonomic errors appear to have been made as a result of considering plants with inaccurate records of origin, as noted by Banks and Clemesha (1990).

As early as 1969, when distributions were still relatively poorly understood, Dockrill (1969) recognised the varieties var. *speciosum*, var. *hillii*, var. *grandiflorum* and var. *curvicaule*, and made some astute general comments that are even more relevant to understanding the variability of *D. speciosum* at the present time:

> "...the varieties... are very difficult to interpret correctly, as the features which are supposed to distinguish one from the other are extremely unstable and merge from one form into another, and in some cases are the result of environment only... it would be best to look upon the species as one extremely variable whole."

The major conclusion reached after consideration of each of the varieties is that the variation within them, and the overlap between them, is actually much greater than was initially considered, now that more populations have received study. The varieties are best regarded as intergrading, forming a species complex in which typical and atypical plants occur. The definition of a species is difficult and arguable, especially for orchids. However, most botanists require clear-cut and constant differences in several characteristics, with absence of intergrading features and of intermediate forms, before assigning specific status. The definition used in the ongoing Flora of Australia project (Flora of Australia 1981) uses the definition "largest group of individuals between which there are no distinguishable consistent differences in form or reproductive mechanisms". For the *D. speciosum* complex, *D. speciosum* Smith, and not any smaller subgroup, meets this definition.

If a narrow view of the species concept was adopted, using only two or three, sometimes inconsistent differences in characteristics as the basis for each species (Clements 1989), a variable orchid such as *D. speciosum* could be broken up into numerous "species" with no clear distinction between each, and no botanical key could be constructed to separate them. Such an approach is untenable for *D. speciosum.* When Willis constructed a complete handbook and key for the Victorian state flora (Willis 1970), he consider that several characteristics are required to identify a species, the number being larger for genera (such as *Dendrobium*) with many species. Lavarack and Gray (1985) and Upton (1989) have chosen to consider *D. speciosum* as a complex of varieties, stressing that "intermediates do occur and differences are minor" (Upton, 1989). We are left with a variable species that remains variable in any reasonable taxonomic system that is adopted. There is a view held by some observers who have seen most of the variation, that *D. speciosum* represents one highly variable species occurring over a wide range of habitats and climatic conditions. The use of "varieties" to refer to parts of the species complex is a convenience for easy communication, rather than to indicate absolute differences between populations.

The data presented in this review, including pollinator studies, fragrance biochemistry, and breeding systems, offer no evidence to support the elevation of the different varieties to species rank. As a general principle, proposed name changes for species of *Dendrobium* and other Australian genera (Clements 1989) should not be accepted until convincing evidence is provided to support each proposal. This approach has been previously recommended in discussions of nomenclature in *The Orchadian* (Grundon 1990; Grundon *et al.* 1990).

Evolutionary Aspects

The present distribution of *D. speciosum* is likely to be much more restricted than in the past when eastern Australia was warmer and wetter in the tropical conditions of the Tertiary period (Adams 1990a), and at various times during the climatic changes over the last few thousand years. As conditions became drier and more seasonally extreme, the available habitat has contracted, leaving disjunct distributions in which populations may be gradually changing and becoming more variable, with different characteristics in different regions. Variation is often seen to be greatest at the limits of distributions where climatic extremes place the greatest pressure on survival. Present day geographical separation of some varieties by inhospitable environment may be relatively recent, and should be interpreted with great caution in relation to taxonomic status.

Future Work

The current state of knowledge of morphological variation and biology of *D. speciosum* is fragmentary. The distribution and geographical areas involved are vast, and some conclusions about taxonomic status and pollination biology have been confusing and unwarranted when made on the basis of a small number of plants or observations. There is a need for more detailed studies of populations in different areas, especially in north Queensland, with quantification of variation and growth, search for pollinators, ecology, genetics and biochemistry. Some of these are continuing in our own research group and elsewhere, and will contribute to a better understanding and conservation of the species in its natural habitat. However, they are unlikely to further clarify taxonomic status.

RECOMMENDED NOMENCLATURE

The amateur and professional botanist and orchid grower have grounds to be confused about the nomenclature of *D. speciosum* at present. After consideration of the three proposed taxonomic approaches suggested by Clemesha (1981a, 1981b, 1982, 1986), Clements (1989), and Banks and Clemesha (1990), together with this comprehensive review of all the information available, the following clarification regarding use of names and authorities for *D. speciosum* taxa is recommended:

D. speciosum Smith var. *speciosum*
D. speciosum Smith var. *hillii* Masters
D. speciosum Smith var. *grandiflorum* F.M.Bail.
D. speciosum Smith var. *capricornicum* S.C.Clemesha
D. speciosum Smith var. *curvicaule* F.M.Bail.
D. speciosum Smith var. *pedunculatum* S.C.Clemesha

The use of "varieties" is preferable to "subspecies" for the following reasons. There is considerable overlap in morphology of vegetative and floral characteristics between the taxa, inconsistent features within varieties, and plants with intermediate features in areas where varieties occur together. Furthermore, new biological information about breeding systems and pollination biology indicates only minor differences between varieties.

Some particular populations are still under study, especially the three varieties in the area along and north of the Tropic of Capricorn. The additional use of "forms" for plants from specific areas for each variety, for example the Blackdown Tableland form or forma Genoa, provides meaningful information without alterations to varietal names. It is most important that accurate information is kept of the original location of plants in collections used for research.

The status of *D. speciosum* Smith var. *bancroftianum* Reichb.f. and *D. speciosum* Smith var. *nitidum* F.M.Bail. has been clarified by Clemesha (1981a, 1981b,), and Banks and Clemesha (1990), as *D. X gracillimum* (Rupp) Rupp. The use of *D. speciosum* "compactum" to describe compact plants which may occur in any of the above varieties, is confusing and ill advised.

END NOTE

The author would appreciate receiving information about pollinators meeting some of the criteria for pollination (Adams and Lawson 1988), and also reports of unusual populations or individual plants of *D. speciosum*, for use in ongoing research.

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BOTANICAL ART WORK DONATED TO THE GARDENS

The Australian Orchid Foundation has donated a facsimile of a painting of the golden orchid, *Dendrobium discolor,* to the Australian National Botanic Gardens.

Dr Roger Hantiuk, Director of the Gardens, accepted the donation from Mr Gerald McCraith, Director of the Australian Orchid Foundation, in a ceremony at the Gardens on 20th March 1991.

The facsimile is of a painting prepared by Sydney Parkinson, the artist on James Cook's historic voyage to Australia (1768-71).

Sydney Parkinson (1745-1771) was considered an accomplished artist by 1767 when he was first introduced to Joseph Banks and taken into his employment. He made at least 1300 sketches and drawings during the voyage to South America and the Pacific with Captain Cook. Parkinson completed 280 of the drawings, painting sections of many of them to show the colours of the live plant. Parkinson died of fever during the return voyage at the age of 26; cutting tragically short the life of one of the most talented natural history artists of the eighteenth century.

Sir Joseph Banks commissioned engravings from Parkinson's sketches and original paintings on his return to England. The engravings, however, were not published in Banks' life-time and the plates were preserved in the British Museum after his death. The engravings were first produced in colour in 1981, over 200 years after the beginning of the voyage. They are now known as Banks' Florilegium.

AN APPRAISAL OF THE SPECIES CONCEPT IN THE TAXONOMY OF AUSTRALIAN ORCHIDS

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In the recently published *Catalogue of Australian Orchidaceae*, Clements (1989) proposed many changes to the previously accepted nomenclature of Australian orchids. Some of these changes stemmed from past misinterpretation of types and other specimens, misapplication of nomenclatural rules, and discovery of previously overlooked names. Such changes are appropriate. However, in addition to these changes, there were numerous others involving the elevation to species rank of many well known subspecies, varieties and forms. Some of the more contentious changes are listed in Table 1.

I am not prepared to accept the elevation of many of these taxa to the rank of species. Taking *Dendrobium speciosum* Smith as an example, I feel that, if the five new species proposed are justified, so too are numerous others, and the position then becomes ridiculous. At the same time, while I appreciate the differences between the taxa which have lead the author of the Catalogue to make these changes, I can also see even more similarities between them. It is here that it would appear to me that problems arise from different philosophies. In the Catalogue, undue weight appears to have been given to differences at the expense of similarities. It is clear that our two concepts as to what constitutes a species differ.

Taxonomy is built on the species concept, but no one has yet satisfactorily defined that concept. The reason for this lack of definition is that "Nature" does not recognise species. All living organisms differ from each other to some extent. What we see when we look at the plants and animals around us is a moment in the multi-million year history of their evolution, frozen for an instant. Some groups of related species have only recently diverged from their common ancestor, while others have been separated for longer periods, so that the level of distinctness of no two pairs of species is the same. To attempt to make some order out of this confusion, taxonomists classify all organisms into the convenient boxes labelled "species". The existence of these boxes, each with its own species neatly contained within, implies that all species are equivalent, but this is by no means true. It gives the botanist a convenient name to use, but does not represent the situation in nature. The placing of the species in their boxes remains a subjective process despite the use of computer classifications. Perhaps when we can delve into the DNA of each taxon the subjectivity may be reduced, but another possible outcome of this research may be to confirm that there are no distinct entities (or "basic units") in nature.

In looking for the evidence to justify their

Table 1. Some taxonomic changes made in the *Catalogue of Australian Orchidaceae*

Accepted name prior to the Catalogue	No. of proposed new or reinstated species
Dendrobium speciosum	5
Dendrobium teretifolium	5
Dendrobium tetragonum	4
Dendrobium canaliculatum	3
Dendrobium bigibbum	4
Dendrobium lichenastrum	2
Dendrobium linguiforme	2
Bulbophyllum macphersonii	2

systems, taxonomists can readily fall into the trap of becoming so immersed in the detail of the differences in the plants they are studying that they lose sight of the overall similarities. In other words, they become "splitters". In my opinion, this is precisely what has occurred in the preparation of the Catalogue.

Before setting out to change established names, it is important that an author elaborates the criteria used to determine the status of the taxa recognised. In the Catalogue, the statement is made that:

"For the purposes of this paper, I have adopted the principle that most taxa, (i) with more than one or (ii) with several difference(s) in morphology and biology, should be ranked as species".

This discussion, which amounts to about 3 lines in a 160 page publication, is inadequate to justify the major changes proposed to the nomenclature of well known species. In another publication, Clements (1990) states:

"Basically, it is my belief that if a unit can be defined either by its morphology, biology, genetics or all of these, then it should be treated as distinct and afforded the rank of species, pending a more thorough study of the plants biology. Moreover, if all of the individuals in a unit share common characters and in so doing are more closely related to one another than they are to anything else on earth then they should be treated as a species. This is also true for all levels in any classification. To confer any other rank on the basic unit other than that of a species, without first conducting a study on the plants biology (genetic make-up, breeding biology etc.) is to imply a level of knowledge about that taxon which we cannot possibly possess. The only rational course of action is to treat these basic units at the rank of species. Only through a study of the biology of a taxon would it be possible to determine the true relationship between the taxa concerned."

In my opinion this is the same as saying "if in doubt call it a species". As I hope I have already demonstrated, all species are not equivalent and the "basic unit" mentioned above is no better defined than the species. In fact, by the definitions quoted above, virtually all species are in doubt as the investigations suggested as necessary have only rarely, if ever, been undertaken.

There has been criticism (Clements 1990) of "Conservative taxonomy". There is no alternative to a conservative approach in that proposed changes must achieve a reasonable consensus after all arguments are considered. Any departure from this can only lead to chaos. In other words, if a significant number of botanists remain unconvinced, the previously existing situation must be retained.

The definition of a species or a basic unit, given above, is no more help than the usual ones. It remains totally subjective and a matter for the personal judgement of each worker as to what "can be defined by its morphology, biology, genetics or all of these". If there is such a thing as a basic unit for a group of individuals, and if species are not all of equivalent rank, then should not some of these basic units be varieties or subspecies or some other unit?

Another insight into the species concept used in the Catalogue is given by Dr Ben Wallace (1990) who, in reviewing the Catalogue, claims that "modern ideas revolve around a population of breeding individuals or groups of such populations between which interbreeding is frequent". He goes on to say that Clements has "openly stated that populations which do exhibit a recognisable form and are separated from other obviously related ones by a barrier, even simply distance, should be recognised at species level..."

I wish to challenge this concept of a species on three grounds: (i) is distance a meaningful barrier; (ii) how can we prove what is an effective barrier; and (iii) how do we judge the level of distinctness allowable between species and the level of variation within species.

All widespread species exhibit regional variation, and virtually all have geographical or distance barriers somewhere in their distributions. In my opinion, simple geographic separation is not a useful criterion to incorporate into a species concept, particularly when the massive changes in climate and vegetation cover over the last 20,000 years are considered. Populations now separated by water or by arid country may have been continuous only a few thousand years ago. In some cases the time scale may have been as short as decades, as with the changes in vegetation following the cessation of Aboriginal burning. Then there are the continuing massive vegetation changes caused by modern-day man which have resulted in previously connected populations now being separated by cultivation or urban development.

Barriers, other than distance, have also been considered. In my opinion, the use in taxonomy of barriers such as separation from interbreeding by the use of different pollinators is fraught with problems. Until such time as the actual effectiveness of these barriers is known, I would place little value on them. The inference is that small differences in the colour or in the ornamentation of the labellum, for example, indicate that the plants are attracting different pollinators and therefore do not interbreed. Few pollination studies have been undertaken to check this opinion, and those that have been carried out indicate multiple and shared pollinators (e.g. Adams 1991; Adams and Lawson 1988) casting further doubts on these assumptions. It is my view that there is virtually no evidence available to justify the taxonomic separation of otherwise generally similar populations on these grounds. Further, the pursuit of this line of investigation of taxonomy through the pollinators is likely to become bogged down in complex questions of insect taxonomy which is no better understood than orchid taxonomy.

The size and nature of differences necessary to separate species cannot be defined and must remain a subjective judgement by the taxonomist, although most taxonomists would require several consistent differences. There has been no attempt in the Catalogue to set any limits, and all I can say is that it is evident that the author of the Catalogue accepts much smaller differences than I (and many other taxonomists) would to distinguish between taxa.

Clements and Jones (1990) go into some detail concerning the *Dendrobium tetragonum* complex, although no keys or detailed justifications are given. There is little doubt in my mind that the four taxa proposed are a vast improvement on the previous position. What I question is the rank given to them. Those interested in the taxonomy and relationships of *D.tetragonum* must consider the question " do the differences illustrated in *Lindleyana* (a) really represent the total variation present, and (b) do they outweigh the obvious vegetative and floral similarities that have led botanists in the past to consider this as one species?" My opinion, after looking at the evidence, is that I prefer to regard this as one species with four subspecies or varieties. This is purely a matter of judgement, and not of fact, and this, like it or not, is what taxonomy is all about.

The above is the situation as I see it regarding the species concept used in the Catalogue. At the level of the individual changes in the Catalogue, only the barest justification, or none at all, is given. The orchid-growing and scientific communities are being asked "trust me, I know what I am doing". Well, for changes of such magnitude, this approach is just not good enough. Detailed reasoning must be given, or else it is no more than a personal opinion.

It is a pity that contentious and, I maintain, unproved changes such these were first published in the Catalogue which should be a list and not a vehicle for nomenclatural change. There is now a real possibility that the useful parts of the Catalogue, and there are plenty of these, will become immersed in the debate over the less popular changes.

Where does all this leave us? Clearly from the foregoing I, for one, do not accept the criteria used in the Catalogue. The decision on what is a species, and what is not, has always been a matter of judgement based on years of experience on the part of the taxonomist, and on a careful consideration of the amount of variation present between and within populations. Because I have not carried out these studies, I cannot categorically state that Clements is wrong, but then he has produced virtually no evidence that he is right. In reality, neither of us is "right" or "wrong", we simply have different points of view. However, as it requires a change to the presently accepted situation, those wishing to have a change accepted must produce more information if their point of view is to be accepted. Until this happens, I can see no value in upsetting the accepted status of well-known taxa such as those listed in Table 1.

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AUSTRALIAN NATIVE ORCHID HYBRID REGISTRATIONS

(New registrations from lists in *The Orchid Review*, April to August 1991. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review*.)

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Aileen	Nunkumbil x Susan	W. Skillicorn
Brellen	Ellen x Peach Glow	S. Batchelor
Brinawa Charm	Peewee x *kingianum*	J. Jarvis
Brinawa Jewel	Specio-kingianum x Kim	J. Jarvis
Buttermilk	Emma x *falcorostrum*	W. Upton
Coconut Ice	Aussie Bonanza x Hastings	R.E. Harris
Colonial Blush	Bardo Rose x Aussie Mist	P. Spence
Colonial Bullion	Eureka x Sunglow	P. Spence
Colonial Campio	Aussie Angel x Hilda Poxon	P. Spence
Colonial Desire	Aussie Angel x Peter	P. Spence
Colonial Fanfare	Hastings x Peter	P. Spence
Colonial Flirt	Aussie Angel x Star of Gold	P. Spence
Colonial Freedom	Emma x Aussie Mist	P. Spence
Colonial Gold	Emma x Star of Gold	P. Spence
Colonial Summit	Yondi x Aussie Ecru	P. Spence
Colonial Surge	Aussie Bonanza x Kim	P. Spence
Colonial Surprise	Aussie Angel x Aussie Ira	P. Spence
Colonial Torch	Jamie Upton x Warrambool	P. Spence
French Lace	*falcorostrum* x Coljohn	W. Upton
Gillieston Glow	Stephen x *teretifolium*	W. Skillicorn
Gold Flow	Eureka x Aussie Majestic	W. Skillicorn
Mia Star	Graham Hewitt x Miara	N.E. Roper
Mini Gem	*bigibbum* x *carronii*	Univ. of Hawaii
Molly Dunne	Brinawa x Ellen	J. Jarvis
Pink Crystal	Jombock x John Upton	W. Upton
Pink Star	Peewee x *ruppianum*	N.E. Roper
Redback	Kingrose x *speciosum*	N.E. Roper
River Royal	Star of Riverdene x Ellen	W. Skillicorn
Specibil	Nunkumbil x *speciosum*	W. Skillicorn
Star Kim	Star of Riverdene x Kim	W. Skillicorn
Superb-King	*X superbiens* x *speciosum*	Florafest's
Parachilus		
Tigersun	*Prcls.* Tigress x *Sarco.* Fitzhart	Simpson Orch.
Tigress	*Sarco.* Fitzhart x *Psarco. spathulatus*	Simpson Orch.
Pterostylis		
Jack Warcup	*baptistii* x *furcata*	G. Nieuwenhoven
Sarcochilus		
Peach Spots	*fitzgeraldii* x *weinthalii*	Simpson Orch.
Sun Spot	Fitzhart x *falcatus*	R.E. Harris

ANOS: AN HISTORICAL SUMMARY

Noel J Grundon
4 Jean Street, Toowoomba Qld. 4350.

Life would be so dreary without those wonderful coincidences that occur from time to time, and add such spice and zest to our normal, every-day living. One such coincidence came my way when I was putting the finishing touches to the winter issue of *The Orchadian* (Volume 10, Number 4). I had received Ronald Kerr's article on his personal view of the events leading to the establishment of the Australasian Native Orchid Society Inc. and had prepared it for publication. Then a letter that contained some very old, yellowed pages arrived from Andree Millar. Headed "Circular: The Australasian Native Orchid Society", they were a copy of the original notice sent out by our founding Hon. Secretary, Walter Upton, inviting people to the inaugural meeting of The Australasian Native Orchid Society, to be held on Saturday 6th July 1963.

With the letter was a list of the events that took place behind-the-scenes leading to the formation of the Australasian Native Orchid Society Inc. Such information is of great importance to people interested in the history of societies. But it can easily be lost when the people involved in the events pass onto greener pastures. Hence, this historical documentation deserves a wider audience than the memories of those involved in the formation of ANOS Inc.

The Australasian Native Orchid Society Inc.: The beginnings in date order

Numerous discussions and correspondence took place in 1962/63 between Bill Murdoch, Wal Upton, Leo Cady, Stephen Clemesha, and Jim Scott.

17/1/63: Discussions over luncheon at the Masonic Club, Sydney, between Bill Murdoch and Wal Upton for the formation of a native orchid society.

5/2/63: Further discussions over luncheon between Bill Murdoch, Wal Upton and Jim Scott.

6-15/2/63: Draft constitution prepared by Wal Upton and copies mailed to Bill Murdoch, Leo Cady and Stephen Clemesha.

23/3/63: Initial meeting to consider the formation of a native orchid society held at the YWCA Liverpool Street, Sydney, commencing at 10.00 a.m. Those in attendance were: Keith Bursill, H.M. Borbridge, Bas Borger and Mrs Borger, Leo Cady, W.G. Cannons, F. Childs, John Dorman, Stephen Clemesha, John Ezzy, Eric Gordon, Ron Kerr, Bill Murdoch, Harry Rhodes, Jim Scott, Bill Smoothey, William Spinks, Charlie Taylor, and Wal Upton. It was agreed that the society be called The Australasian Native Orchid Society, and that a committee be formed to organise an inaugural meeting. Committee: Bill Murdoch (Chairman), Wal Upton (Hon. Secretary), Stephen Clemesha, Ron Kerr, and Jim Scott.

Meeting of Committee at Ron Kerr's home in Hornsby.

26/4/63: Luncheon at Masonic Club, Sydney, between Bill Murdoch and Wal Upton to discuss progress.

29/4/63: Discussion between Jim Scott, Ron Kerr and Wal Upton at O.S. of NSW meeting on progress.

18/5/63: Meeting of Committee at Ron Kerr's home attended by Bill Murdoch, Ron Kerr and Wal Upton.

June 63: Circular inviting interested native growers, etc., to become members of new society and to attend the Inaugural Meeting.

29/6/63: Meeting of the Committee at Ron Kerr's home. Murray Corrigan and Eric Gordon invited to attend. At this point, 59 members had paid their dues.

6/7/63: Inaugural Meeting held at the YWCA Liverpool Street, Sydney, commencing at 10.20 a.m. The meeting was attended by 81 persons and terminated at 1.15 p.m. The office bearers and committee elected were:
President: W.H. Murdoch
Vice Presidents: E. Gordon, J. Scott
Hon. Secretary: W.T. Upton
Asst. Secretary: S.C. Clemesha
Newsletter Editor: M. Corrigan
Gazette Editor: R. Kerr
Treasurer: J. Soiland
Records Secretary: R. Curtis.

15/7/63: First Committee Meeting held at Eric Gordon's factory, Gouldburn Street, Sydney.

2/9/63: At the 6th Committee Meeting, the first issue of *The Orchadian* was collated and posted.

CONSERVATION ACTIVITIES

ANOS CONSERVATION REPORT

G. Bradburn
10 Jaylang Place, Figtree, NSW 2525.

This brief report will cover the progress made by the Australasian Native Orchid Society Inc. in the area of conservation. A Conservation Policy has been developed and a Conservation Subcommittee has been formed to maintain contact with all ANOS Groups and associated societies through a Conservation Newsletter. A Conservation Fund was formed to promote conservation. To help raise funds, Conservation Badges are released each year. We chose *Diuris purdiei* from Western Australia as the subject of the first badge (1989) because its plight typifies the problems facing many orchid species. It is also proposed to run the NSW Tuber Bank to increase the availability of terrestrial orchids from legitimate sources and to raise funds for the conservation fund.

The 1990 Conservation Badge featured *Dendrobium bigibbum. Thelymitra epipactoides*, found in Victoria and South Australia, is featured on the 1991 Conservation Badge because it is now rare after its habitat has been cleared for wheat farming. These badges have a number of aims:

(a) To provide funds for conservation,
(b) To increase public awareness in relation to the specific orchid species depicted on the badge,
(c) To increase public awareness in general concerning the plight of Australasian orchid species, and
(d) To publicise the endeavours of societies which are engaged in the conservation of native orchids.

The Subcommittee has written to the NSW and Western Australian governments concerning *Diuris purdiei* and *Pterostylis gibbosa*. Although some progress is being made, the problems facing *Diuris purdiei* will require that ANOS and all societies give as much support as possible.

Most ANOS Groups have Conservation Officers who meet together once a year. This year they gathered at Three Mile Dam near Mt. Selwyn in the Snowy Mountains on the Australia Day long weekend. Twenty ANOS members representing eight ANOS Groups from Victoria to the Far North Coast attended.

One of the main concerns of this meeting was the inadequacy of NSW conservation legislation to protect native orchids. It was felt that NSW needs to adopt the more rigorous conditions which apply in states such as Western Australia and Victoria. As such, the ANOS Groups through their Conservation Officers will be gathering support to campaign for improvements including having all NSW orchids placed on Schedule 13 of the National Parks and Wildlife Service of NSW.

Pterostylis gibbosa, the very rare and endangered orchid from the Illawarra in NSW, has been the subject of a scientific study in conjunction with the management plan being developed for the Electricity Commission. This orchid now has a secure future and hopefully it can be managed in such a way as to multiply in its natural habitat. Richard Hanman, the ANOS Macarthur Group Conservation Officer, is the instigator of the recently established Fairfield City Indigenous Flora Park that will be a refuge for the native orchid species from the rapid urban development taking place in Western Sydney.

FAIRFIELD CITY INDIGENOUS FLORA PARK

Richard Hanman
67 Kalang Road, Edensor Park, NSW 2176.

The Fairfield City Indigenous Flora Park is a project sponsored jointly by Fairfield City Council, Fairfield City Garden Club, and interested local residents. The Flora Park has been set up to establish all the indigenous plants of the Fairfield region as a living museum for future generations and as a workshop and field study area for schools and other interested bodies. It will assist in teaching children the value of our flora and fauna.

The Flora Park was officially opened on 28th September 1991, and will make available to the public, plants and seeds of the Fairfield region. To date, the list of native plant species stands at 101, including four native orchid species which still survive in the park. The ANOS Macarthur and District Australasian Native Orchid Society will play an active role in the re-establishment of the remainder of the indigenous orchid species of the Fairfield area in the park.

IMPLEMENTATION OF PROPOSED GUIDELINES FOR ORCHID PROTECTION AND PROPAGATION IN PAPUA NEW GUINEA

N.H.S. Howcroft
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Morobe Province, Papua New Guinea.

Introduction

The recent ban imposed by the Department of Environment and Conservation on the export of wild orchids raises many questions which have to be addressed. For many years there have been a number of attempts to establish the foundations of an orchid industry for Papua New Guinea, based mainly on the artificial propagation of orchids. In this instance artificial propagation is meant to imply orchid plants raised in flask culture by seed or by meristem culture.

In spite of efforts to establish a seed flasking project of this nature in the National Botanic Gardens, the establishment of a micropopagation unit at Mt. Hagen, and the establishment of a valuable scientific orchid collection at Laiagam, all projects have failed to establish an industry based on artificial propagation.

The prime objective of the ban is not to deny the world access to the genetic resources of Papua New Guinea, but to allow Papua New Guinea time to take steps on its own initiative, to conserve, research, develop and benefit from her natural resources.

A Review of the Problems

There are a number of situations in PNG where plant species can be considered to be endangered by overcollecting and by the processes of farming, as well as from rural and urban development. One of the problems we are faced with in the orchids is that we do not know how serious the situation might be from one species to another because we are still collecting information on their distribution, abundance and biology.

The attitude of some past collectors to the present ban has not been a supportive one. Rather, some see it as a negative attitude on the part of government departments, especially as orchids are destroyed by logging operations; for some there just seems to be no end to the orchid populations here, and they see no need for such steps to protect them. Others point out that already the world market has access to cultivated New Guinea plants, so why then should we ban the collection of plants, and, for that matter, why should we consider developing an orchid industry?

The issue of orchids being destroyed by logging or other destructive operations should not be seen as an excuse for plants to be collected by overseas collectors, nor a reason for abolishing bans on exports. It does highlight a need for the National Botanic Gardens to establish rescue or salvage operations with the assistance of the Department of Environment and Conservation and other approved PNG based non-government organisations, to bring such plants into an *ex situ* conservation situation to be used for seed production for the PNG orchid industry.

Another problem was the issuing of permits and certificates which must depend on the correct identification of the species and conservation status of the species. Although it cannot be proven in every case, there have been reports of falsification of species identity and declarations. There is a need to overcome this problem by making better use of scientific authorities with established or proven credibility, and closer cooperation between departments and specialists, botanists, and authorities.

It is also an expressed view that there is no need to ban the export of wild orchids from Papua New Guinea, because Papua New Guinea orchids are already available from other sources. However, this can be challenged on the grounds that, if Papua New Guinea orchids are so readily available on the world market, then there is no need for visitors to collect them as they can be purchased quite legally from plant nurseries.

The term "artificially propagated plants" needs to be redefined, as it includes plants cloned by cuttings and wild plants that have been grown in captivity. While these fit into the definition, they are clearly a weak link in the control of orchid exports and the protection and preservation of certain species. Villagers have been encouraged to collect wild orchids to sell to tourists and professional overseas nurseries. These plants could be said to have come off trees in the village and therefore qualify as "artificially propagated (cultivated!)" plants. Cuttings are equally difficult to approve of as some species do not reproduce by cuttings as easily as others, and any of these difficult species are more likely to be taken by the forward lead of the plant. As a result, no viable part of the plant will be left in the country for further propagation. *Bulbophyllum* and many terrestrial orchids with a sympodial habit and corms, are much easier to take cuttings from, and the residue plant could continue to reproduce. Such plant material could be approved for export when the ban is lifted.

The ban on the export of wild orchids is expected to affect villagers who have been collecting and selling wild orchids to tourists and other collectors. However well intentioned the initiators of this system of income earning were, an impact study should have been carried out to assess the affect on such collecting on the wild population numbers.

Conservation and Protection

There is a considerable amount of knowledge available on Papuasian orchids, but quantitative information is lacking on the range of the species, their habitat requirements and their conservation and protection needs. This problem is to be addressed in the following ways:

1. Collection and collation of information on the geographic range of each species, their habitat and frequency of occurrence.
2. Assessment of the condition and permanency of the habitats.
3. Assess size and conditions of populations.
4. Identify "opportunist" species which come into urban and disturbed situations as volunteers and which proliferate freely.
5. Identify species requiring full protection.
6. Establish both *in situ* and *ex situ* conservation areas.
7. Establish research programmes on orchid propagation (and other indigenous flora) of Papua New Guinea. These will consist of programmes supported by government and non-government organisations which in turn will be supported by actions 1 to 6 above. The programmes will include staff development and training and eventually extension services.

The Ban and Scientific Institutions

Scientific institutions recognised by the Government of Papua New Guinea, its Forestry Department (FRI) and the Department of Environment and Conservation (DEC), will be granted permission to collect live and preserved specimens, and to export to that institution with the following provisions:

1. The institution concerned must be a herbarium with Botanical gardens, and must be recognised internationally.
2. Duplicates or originals of any new species not previously held by the National Botanical Gardens or Herbarium must be lodged with the National Botanical Gardens or Botanical Gardens nominated by the O.I.C. Botany Branch at Lae.
3. In the event that the recipient institution artificially propagates any new species, that institution returns live samples to the Lae National Botanical Gardens. In the case of a species being a highland species, this would be sent to the Botanic Gardens at Goroka or to a reserve nominated by Botany Branch at FRI in Lae.
4. Publications and scientific data of any type relating to the collections are to be lodged at the Lae Herbarium in duplicate form.
5. No fees will be charged for any form of documentation on the assumption that this would be established as a form of reciprocation between institutions.
6. CITES permits must be obtained for both import and for export before the plants are approved for shipment. Phytosanitary certificates must also be furnished with the consignment.
7. All plants must be inspected by an approved botanist or by an authority on orchids approved jointly by DEC and FRI Botany section at Lae.

The Ban and Overseas Visitors

The ban will only affect the past practice of exporting wild orchids. It will not affect the export of artificially propagated orchids. It is likely that a charge will be made for permits. This will depend on the outcome of future meetings between the two departments.

The Ban and Local Nurseries

Local nurseries that rely on the sale of wild plants will be affected and will need to change over to raising plants from seed and tissue culture. There are indications that this has started in the Southern Highlands. Such business operations will be inspected by officers from both departments to ensure that only artificially propagated plants are produced and sold from these nurseries. The officers will also assist such operations with their expertise.

Implementation of Orchid Propagation Projects

It is planned to establish a Flora Conservation Project in Papua New Guinea wherein a genetic resource base for orchids and other endangered species will be established; laboratory facilities will be established for research into endangered flora for government institutions, private organisations, projects and other conservation organisations.

The project will implement the following:

1. It will help to maintain the genetic resources of flora in Papua New Guinea.
2. It will establish a local orchid industry based on the artificial propagation of orchids by seed and tissue culture in flasks in aseptic conditions with special emphasis on endangered species as well as other species of special horticultural value.
3. It will liaise with existing government and public botanical gardens and orchid centres to increase the number of species and genetic qualities.
4. The project is expected to encourage the development of small orchid farms at village level as a source of additional income from the sale of flasked seedlings, cut flowers and tourism.
5. The project will also compliment other institutions and organisations' flora research by collecting scientific information on orchid distribution, habitat, conservation and protection requirement for a data bank.

Conclusions

The implementation of the present ban will give Papua New Guinea time to organise its financial, human and natural resources to achieve its objectives to protect and propagate its orchids. It is the wish of both FRI and DEC that this will be of benefit to both Papua New Guinea and the world of orchid enthusiasts in the near future and in perpetuity.

BOOK REVIEWS

SONGS OF THE FOREST

By Edwin Wilson. Publishers: Hale and Iremonger. Recommended retail price: $12.95.

This is a delightful refreshing book that is so much a part of nature and our beloved bush.

Songs of the Forest, beautifully illustrated by Elizabeth McAlpine, is Edwin Wilson's seventh book. Ed was born at Lismore, NSW, and is currently Public Relations Officer at the Royal Botanic Gardens, Sydney. In this book he pours out his soul to bring us his thoughts and feelings of the countryside he grew up in.

One might well ask "What has this got to do with native orchids?" The answer is simple. Here you have in beautiful language, habitat descriptions, the sensuality, the belonging, the naked truth, of some of our orchids, written by a man who knows them well, who was brought up with them, and through whose eyes and words we can learn so much more about the reality and the very reason for our loving them.

Ed takes us on trips to North Queensland. So vivid are the feelings he exudes in his verse that one can almost smell and hear the songs of our rainforest.

I recommend this down to earth, yet divinely refreshing book. It will take away the depressions of our modern world and take us back to nature.

Walter T. Upton.

ORCHID MONOGRAPHS, VOL. 5, THE GENUS NERVILIA *(ORCHIDACEAE) IN AFRICA AND THE ARABIAN PENINSULA.*

By B. Pettersson. Published and Distributed by Rijksherbarium/Hortus Botanicus, P.O. Box 9514, 2300 RA Leiden, The Netherlands. ISBN 90-71236-08-0.

245 mm x 170 mm, soft cover, 94 pages of text, keys, distribution maps, drawings and 16 colour plates. Price upon application to the publishers, which varies depending upon the size of the individual issues.

The work is mentioned for the keen student only because there is only one species listed that is found in Australia - *Nervilia crociformis* (Zoll. & Mor.) Seidenf. This orchid is widely distributed through Africa, India, Nepal, Thailand, Indo-China, Malaysia, Indonesia, Philippines, Papua New Guinea, and north Queensland. Genera covered in previous volumes include *Acriopsis, Bracisepalum, Bulbophyllum, Chaseela, Chelonistele, Entomophobia, Geesinkorchis, Nabaluia, Oberonia, and Pholidota.* Manuscripts accepted for publication include *Aerides, Ania, Tainia, Hancockia, Mischobulbum,* and *Coelogyne* section *Tomentosae.*

Murray J.G. Corrigan

ORCHIDS OF SOUTH AUSTRALIA

By R.J. Bates and J.Z. Weber.
7 December 1990. Publishers: A.B. Caudell, Government Printer, South Australia.
ISBN 0-7243-6588-5.
245 mm x 175 mm, soft cover, 182 pages, 58 pp. colour with 229 orchid species represented, includes distribution maps and many drawings by Erika Stonor.
Recommended retail price: $29.95 from booksellers and from S.A. State Print.

A wonderful book that lives up to the aims of the authors', as enunciated in part of the Preface:

> "A book on orchids of South Australia was first conceived in 1982 following the donation of a full set of colour prints of South Australian native orchids to the Adelaide Botanic Gardens by the Native Orchid Society of South Australia. This publication which is the result of that initiative contains colour photographs, which are intended for use as a field guide, and information on orchid biology, ecology, and history and descriptions of 140 or so species recorded for South Australia. It also contains diagnostic keys accompanied by drawings, which the careful observer will find invaluable. We hope anyone interested in orchids will be able to identify them using this book, the only complete account of South Australian orchids to have all species illustrated by colour pictures. Distribution maps and habitat notes are included for each orchid."

Chapters include:
Introduction; Ecology and Phytogeography, Conservation, Cultivation.
A Classification History; Richard Sanders Rogers.
Orchid Morphology.
Orchid Pollination; Deterring Non-pollinators.
Mycorrhizas; Orchid Mycorrhizas, Orchid Seed, Germination of Seed, Growth of Terrestrial Orchid Plants, Orchids Dependent on their Fungi.
Orchid Classification and Descriptions.
Conservation Status of Orchids in South Australia.

This book is a key reference work that deserves a place in every orchid student's library!

Murray J.G. Corrigan

ORCHID BIOLOGY - REVIEWS AND PERSPECTIVES, V

Edited by Joseph Arditti, 1990. Published by Timber Press, Portland, Oregon, USA.
ISBN 0-88192-170-X.
The latest in this great series of orchid classics. 370 mm x 195 mm, hard bound, 452 pages, black and white photographs, line drawings and tables.
My copy AUS$105.00 from Orchids International.

Australian contributions include: "The Western Australian Fully Subterranean Orchid *Rhizanthella gardneri*" by K.W. Dixon, J.S. Pate and J. Kuo; and "Water Relations in Orchids" by Russell Sinclair. Other articles are: "Orchids in my Life"; "Auto-Pollination in the *Orchidaceae*"; "A Review of the Genus *Dactylorhiza*"; "Power and the Passion: The Orchid in Literature"; "Perspectives of the Tropical Orchid in Space Research"; and "Flowering Months of Orchid Species under Cultivation".

This is certainly a book for the serious student, especially as the purchase of one volume will whet the appetite and require the acquisition of the remainder of the series.

Murray J.G. Corrigan

DRAWINGS BY J.J. RILEY

John Riley has kindly provided ANOS Council with a series of superb watercolour prints of his work. These prints are available at a comparatively small cost from the Treasurer, ANOS Inc. (see advertisement on centre page).

An example of the quality of this offer can be seen in the superb rendition of *Sarcochilus australis* on the rear cover of this issue. The Editor hopes that he can provide readers with further examples of the work of John Riley and other artists in future issues of *The Orchadian.*

A GUIDE TO ORCHIDS OF THE WORLD

By M. Hodgson, R. Paine and Neville Anderson. 1991. Publishers: Angus and Robertson.
ISBN 0-207-16035-X.
285 mm x 215 mm, hard bound, 236 pages, many colour reproductions, distribution maps, black and white drawings and text which claims to cover 450 species.

The Preface states in part:

> "A Guide to Orchids of the World has been designed for the keen amateur and exacting professional grower alike."

Tragically the book does not live up to the claim. The text is inaccurate and contradictory, and many of the orchid names are out of date. The book was obviously not edited by a professional editor, or reviewed critically by orchidologists. In contrast, the layout is pleasing to the eye, with plenty of colour, contrasted with black and white drawings that are decorative, but not botanically informative.

The use of minute description maps, with yellow overprint to represent the orchid's range is unfortunate. In some cases the minute spot of yellow is difficult to find and of no relevance.

To quote a few examples of the inaccuracies, contradictions, and out of date nomenclature:

1. Under "Parts of an Orchid", the authors use incorrect names. A drawing labelled *Dendrobium tenuissimum* shows "leaf pendulous terete", when surely they mean *Dendrobium mortii.* Clements in his 1989 classic *Australian Orchid Research* Vol. 1, pp. 48, clearly shows that due to previous incorrect determination, the correct name for the orchid previously known as *D. tenuissimum* is *D. mortii.* Similarly, *Dendrobium ruppianum* should be *D. jonesii.*

2. On page 1 we read: "Orchid hunting will take the enthusiast through a diverse range of habitats in most parts of the world, except arid and frozen regions." Then on page 8 is: "Orchid habitats are diverse, ranging from the arctic regions to the tropics ..."

3. On page 21 we are told: "This amazing orchid, *Rhizanthella gardneri* grows and flowers underground." Two lines later we are told: "When the flower is ready to open, the floral bracts force open the soil allowing the rosette of flowers to open at ground level ready for pollination." The drawing adjacent to these statements clearly shows the whole of the "centre rosette of flowers" flowering completely above ground. Which do we believe, underground, ground level, or above ground?

Reference to David Jones' classic *Native Orchid of Australia* or Dixon, Pate and Kuo in Arditti's just released *Orchid Biology - Reviews and Perspectives V*, clearly shows that the inflorescence may be exposed to the air, but is actually situated several millimetres below the soil surface. While the authors can be forgiven for not having read the most recent paper by Dixon, Pate and Kuo, there can be no excuse for not having consulted the book by David Jones, or the previous work by Dixon or Clements!

4. On page 22 we read: "Open grasslands are the home of thousands of species of terrestrial orchids. *Pterostylis* and *Diuris* in Australia, *Spiranthes* in southern Asia ...."
The authors are perhaps unaware of the wide distribution of *Spiranthes sinensis* in Australia, from northern Queensland, through NSW, ACT, Victoria, Tasmania, and southern South Australia.

5. On page 26, with reference to *Vanda* Miss Joaquim, the following appears: "First developed for the Singapore cut-flower market, ..." Teoh Eng Soon in his article "A Joy Forever *Vanda* Miss Joaquim: Singapore's National Flower", tells us that Agnes Joaquim found the plant in flower, in her garden, amongst plants of *Vanda hookerana* and *V. teres.* Upon taking it to Henry Ridley, then Director of the Singapore Botanic Gardens, it was confirmed as a natural hybrid between the two abovementioned species. The year was 1893! This natural hybrid became a great favourite and was to be found in gardens, and as hedges, throughout Singapore, long before the cut-flower trade developed.

6. Readers will be interested to know that *Sarcochilus ceciliae* has a distribution "eastern coast and nearby mountains", and that *S. hartmannii* is "Native to eastern Australian coast and nearby mountains".

There are many errors, too frequent to list. I could not recommend this book to members, and sincerely trust the publisher does not attempt a reprint without knowledgable editing, correction and re-setting.

Murray J.G. Corrigan.

THE 28TH ANNUAL GENERAL MEETING OF ANOS INC. HELD AT THE WOLLONGONG BOTANIC GARDENS ON 17TH AUGUST 1991

Walter T. Upton
PO Box 215, West Gosford, NSW 2250.

The gardens were a superb venue which gave much to create a happy occasion. It was a pity that only 21 members attended. For me it was, in many respects, a sad occasion as it was my last AGM as President, but not my last AGM by any means.

Those members attending were: from Newcastle Group, George Hillman and Len Field; from Central Coast Group, Pat Burns, Alan Dash, Albie Sherwood, Ken Smith, Gary Sweikert, John Turner, and Wal and Jill Upton; from Warringah Group, Barry Collins, Ken Organ and Phil Spence; from Sydney Group, Michael Harrison; from Port Hacking Group, Steve Deards, and Bob and Janet Napier; from Macarthur and District Group, John Riley; and from Wollongong and District Native Orchid Society, Graeme Bradburn and Rod Trevenar. Twenty-one apologies were received.

A report from our hard working Treasurers, Bob and Janet Napier, showed a healthy position.

Our Conservation Officer, Graeme Bradburn reported on conservation activities and urged members to purchase the new Conservation Badge. Owing to pressure of work, Graeme is unable to continue as Conservation Officer. I thanked him for his dedication and for a job well done. It will not be easy to find a Conservation Officer of his dedication and quality, but we must give it great priority. Our work in conservation must progress, and all Graeme's hard work must not be wasted.

In the President's Report, I stated that I had enjoyed the last three years as President, despite the considerable amount of work needed to keep the Society progressing. I thanked the Councillors for their support, and also the loyal members of ANOS, asking them to continue to support *The Orchadian.* I thanked Andree Millar, in her absence, for her services to ANOS as secretary over the last year. Mention was made of several new Groups - Brisbane, Kabi, Hawkesbury, and Wide Bay - recently formed; we wish them continued success. Some of the achievements over the last year were: tuberiod bank, conservation days, new badges, Ken Russell's shows, autumn show, raffle for John Riley's drawing, membership now by credit card (this has overcome the overseas membership problems), and the Wollongong Conference and Show. The Native Orchid Society of Toowoomba Inc. will host our 2nd Conference and Show in September 1993.

The Orchadian has progressed under the Editorship of Noel Grundon, and with Murray Corrigan and his team looking after production co-ordination, it should continue to progress. There is still a need for cultural articles, so come on members, put pen to paper, tell us how you grow your favourite orchid.

Ron Wheeldon has been appointed Registrar of Judges. After our last judging school, we appointed 7 new Associate Judges. We have prepared a syllabus for judging schools in other states, and this has been submitted to Queensland for their views, with the hope of starting a judging school there in 1992.

I have agreed to write the ANOS NEWS in future, and will do my best to produce it at least quarterly.

The point was made that we seem to have some disgruntled members in the groups. Talking against ANOS does not help our society nor promote native orchids. We must pull together. Those who are complaining are usually those who do little. Your councillors give a lot of their time; support them and we will progress.

This being my retirement as President, Michael Harrison said many kind words about my service to ANOS, and presented me with an ANOS Gold Medal "For Outstanding Service". In reply, I remarked that neither Bill Murdoch nor I realised how far ANOS would succeed, and I expressed sorrow that Bill was not here to receive a Gold Medal also.

The election of officer bearers then took place (see inside front cover of this issue for list of new officer bearers). Barry Collins, our new President, then took the chair.

Phil Spence spoke of a recent meeting with Hermon Slade when he expressed his willingness to continue as Patron for another three years. This was happily accepted by the meeting.

The position of Auditor was discussed at length. It was decided to appoint Jill Upton for the coming year while a further search was made for an auditor to be appointed at the next AGM.

ANOS Central Coast Group offered to host the next AGM in the Gosford area on 8th August, 1992. The meeting closed at noon.

THOSE CURIOUS ORCHID ROOTS

Ruth Rudkin
PO Box 524, Dee Why, NSW 2099.

[Ed. - This article is largely based on that of Pridgeon (1987), and has been condensed for inclusion in this journal. Readers interested in a more detailed discussion should refer to Dr. Pridgeon's article.]

INTRODUCTION

Who has not been intrigued by the difference between the roots of orchids and those of other plants. As a novice watching a demonstration of repotting cymbidiums, I was surprised at the "treat 'em rough" approach to the roots. On an excursion to the Comboyne Plateau in NSW, I saw my first epiphytes growing on trees. As my modest collection grew, I found orchids whose roots climbed out of the pot, while others did not. Some clung on to rocks or other pots and were difficult to remove. Orchids were mounted on small pieces of branch, on cork, and on wooden palings. Roots grew up or down the branch for nearly 1.5 m. Some just hung in the air. I found that some growers had their plants growing in empty pots or baskets. On the other hand, terrestrials were different, with their tuberoids and their dislike of being moved.

Failing to find anybody to discuss orchid roots with me, I began to look around for some information. In orchid books this tends to be very brief. However, in Jones (1988), I found the following:

> "Orchids lack a primary or seminal root system and therefore the entire root system of the plants consists of secondary roots that arise from the stems."

Then follows a brief description of the difference between roots of deciduous and perennial terrestrials and epiphytes, aerial roots, and roots which become attached to a substrate. There are a couple of paragraphs on the storage roots of deciduous terrestrials, and one short paragraph on velamen, the structure that makes orchid roots look so different from roots of other plants. Now I was getting somewhere. Just what was the function of the velamen? An article by Pridgeon (1987) answered most of my questions. When the author was at the First Australasian Native Orchid Conference in Wollongong in 1989, I spoke to him about my ideas.

ROOT STRUCTURE.

Roots are basically cylindrical structures with an outside layer or exodermis, some cortical cells, then an endodermis enclosing the stele or conducting tissue which takes the water and mineral salts to the leaves, and organic material from the leaves to the root cells. As these cells are living, they require the energy released by respiration so they need provision for the exchange of gases, oxygen and carbon dioxide. Figure 1 shows a cross section of a root which has an extra layer of cells outside the exodermis called the velamen. Velamen is found in the roots of *Liliaceae* and *Amaryllidaceae* as well as the *Orchidaceae*. Within the orchids, velamen is found in the roots of terrestrials of many genera, including *Thelymitra* and *Pterostylis*, as well as in epiphytes.

The number of cells in the velamen layer varies considerably, and seems to be mostly a matter of the habitat of the orchid. For example, the *Bulbophyllum* which are found in abundance world-wide in tropical rainforests, have a single layer of cells, while genera found in regions of periodic drying have a multicellular velamen, such as in *Sarcochilus hartmannii* with 3 layers, and *Vanda tricolor* with 5 or 6 layers. The number of layers varies within and between genera. In roots of epiphytes which become attached to a substrate, either a tree or a rock, the root becomes flattened, and the velamen has fewer layers on the undersurface. At the same time, a secretion appears from the velamen which fastens the root to the substrate. In some cases there are also single cell root hairs which can increase the amount of water which can be absorbed.

STRUCTURE OF THE VELAMEN.

The earliest work on the roots of orchids seems to be that of Link in 1824, and from that time there have been numerous studies. With the improvements in microscope technology, more and more detail could be seen. In the outermost layer, the cells are somewhat flattened, and sometimes develop papillae and hairs or wall ornamentation patterns. Air spaces or pneumathodes were found to allow free exchange of oxygen and carbon dioxide between the cortical cells and the thin walled exodermis. Thickenings in the velamen were found and were of various types, spongy, lamellate, discoid, or webbed, and were called tilosomes. Passage cells are present as in roots of other plants which allows for the transport of water and nutrients to the xylem cells in the stele. Cyanobacteria, green algae and mycorrhiza have been reported in orchid velamen, the cortex or both. In some orchid roots, fungal infection begins 13 - 15 mm from the root tip and increases as the root ages.

FUNCTION OF THE VELAMEN.

There has been much argument about the function of the velamen. Early suggestions were that the suberised/lignified, long cells of the exodermis protect the cells in the cortex from drying, and that the thin walled short cells are conduits for nutritive substances from the velamen to the cortical tissue. By 1914, it was generally agreed that it protects underlying tissues from mechanical injury, and prevents desiccation in aerial roots by increasing the boundary layer. However, some thought these were of only secondary importance, and that the primary role was the condensation of water vapour and other gases. Others said it was for the absorption of liquids and solutes.

Many studies attempted to define the function of the velamen. It has been shown that the velamen absorbed water. Claims have been made that aerial roots and adhesive roots are morphologically different, and that in intact aerial roots, only the apical region of the root with living velamen cells can absorb water, and then only for less than 8 days. Other experiments showed that nutrients also were only absorbed by the root tip. From this it followed that the functions of the velamen were mechanical protection and prevention of water loss. It was concluded that the aerial roots of orchids are a "liability" and not an asset to a plant.

It was also found that if the root is modified by mechanical injury, or if it becomes attached to a substrate, the velamen and exodermal cells have thinner walls, and absorption of water and nutrients can then occur, and translocation to the cortex and stele is possible.

However, more recent studies using radioactive isotopes of nutrient elements, have found that within 30 minutes of application to the aerial roots of an *Epidendrum* species, sulphate was transported through the cortex and the passage cells of the exodermis and the endodermis, and accumulated in the xylem vessels nearest the endodermis. Similar studies with other nutrient elements have shown that nutrient salts are absorbed by old and young roots, by root apices and

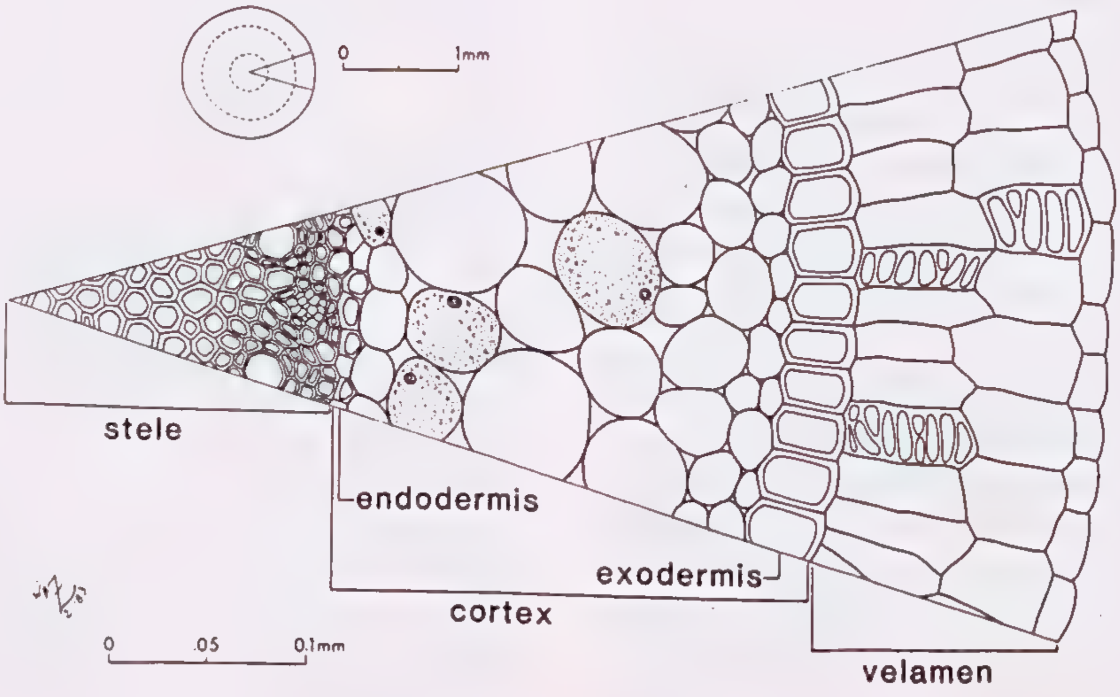

Figure 1. Root transection of *Restrepiella ophiocephala* (drawn from a free-hand section). Reproduced from Pridgeon (1987).

by roots with fully developed velamen, although the rate of absorption was generally slower in older roots. It has been concluded that even old roots are functional, and have some value for the plant. The lowest desiccation rates were found in roots which had the lowest surface area/volume ratio, that is, in roots which were large and thick, such as in *Phalaenopsis amabilis*.

When it came to the discussion of what form of water was absorbed - liquid from rain, or fog or dew, again there were differences of opinion. Also what was the effect of relative humidity? It was noted that epiphytes are found where rain and humidity are periodical, and there are times of drying due to wind or high temperatures when relative humidity falls. They grow in the canopies of forests, and most often in montane regions. It has been suggested that in heavy rain, the first water to flow along the branches (stem-flow) would be rich in nutrients, and would be absorbed in the velamen, while later stem-flow would be nutrient deficient. Hence, roots without velamen would have only limited time to absorb the nutrient rich early stem-flow. Again, if all absorption took place at the tip only, the amount of nutrient absorbed would also be very small. Roots of orchids growing in humus would not need such well developed velamen because the humus also stores water and is nutrient rich. It is those species growing on rocks or exposed branches that need the most developed velamen. Other reasons for a many-layered velamen are to reduce water loss in arid situations, protection from sunburn and for provision for cooling exposed surfaces. The velamen is not as well developed in plants growing where water deficits are not marked, but pneumathodes are required to ensure gas exchange.

It seems clear that the adhesive roots of epiphytes are absorptive, and that absorption is promoted by thick velamen (by prolonging access to moisture), thin walled exodermis, and root hairs. It is not evident to what extent strictly aerial roots are absorptive. There may also be some connection between velamen thickness and the CAM method of carbon fixation, both being adaptations to periods of aridity.

Rao (1981) cites an experiment which showed that effective absorption of inorganic nutrients under experimental conditions was about the same for the leaves, pseudobulbs and roots of *Phalaenopsis* and *Cattleya*. He suggests that the physiology and anatomy of leaves and roots, both aerial and underground, need to be studied in detail in order to improve our understanding of orchid nutrition and the efficiency of fertiliser application in order to get more vigorous growth and flower production. There is still a lot that is not fully understood.

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HOW I GROW AUSTRALIAN NATIVE ORCHIDS

Fergus Martin
615 Victoria Road, Ermington NSW 2115.

I grow my native orchids in a bushhouse, 3 m x 3.75 m in size, facing north, adjacent to the eastern side of a garage, and in four lean-to houses against the fence. The bushhouse has a clear fibre glass roof with two 50% shade cloth sides, one fibro side (garage), and one fibre glass sheeting side (the southern or rear side). Inside the shade cloth is chicken wire and some panes of glass. The lean-to houses have 50% black shade cloth tops and sides.

I have some epiphytes mounted on Coachwood and bark with bush moss and swivel hangings. Terrestrials such as *Pterostylis* are potted in bush soil, while other natives are in an open mix of bark and gravel and grow in the bushhouse. The swivel hangings give the plant a better opportunity of more water as they turn around when being watered and move with the breeze.

The plants in the fence houses are of many genera, including *Dendrobium, Sarcochilus* and *Bulbophyllum*. The epiphytic *Sarcochilus* are grown on the swivel hangings, while the lithophytic *Sarcochilus* are in shallow pots with a medium of mostly bark and granite chips.

There are two Frangipanni trees with a northerly aspect. They have various natives growing and hanging on them, and doing very well, including a large log with *Dendrobium cucumerinum* gradually working its way right around it. The western side of the driveway is occupied with pots of *D. speciosum* and other genera which remain in position all the year.

During the years I have been growing natives, I have tried many ways to get the best results, and find an open mixture the best. For a while I tried lava rock from Queensland. It worked for a while but was not a great success. I find that gravel from ant beds give the medium a boost as it contains trace elements. I gave away using charcoal and sandstone as they retain the water.

Although I have not done any hybridising myself, I have given freely pollen from many of my plants to various people, and some of the crosses have been successful so I have been told.

If I find a plant that is not flourishing, I will either change the mix and/or move it to a new position.

As the epiphytes are hanging and the other plants are in an open well drained medium, they tend to dry out rather quickly, so need more watering, especially those in the closed bushhouse. I have no set watering times, using my judgement according to the weather. Of course in the summer or on very windy days they get watered frequently; it has been known for the watering to be done at 9 p.m. during a heat wave.

About every three months I treat the plants with fungicide, using a spray of Benlate and Dithane 45.

My feeding programme is approximately every three weeks commencing in the Autumn and continuing to flowering, then twice for the balance of the year. I find the rotation method is most successful, using organic mixtures.

As for repotting, I do this when I think the plant needs attention.

My collection has been built up over about 20 years by buying, collecting from private properties and gifts. Of course I have not all the plants I started with, but have gradually culled out those I did not need or could not grow and kept my favourites. At the moment, the *Sarcochilus* group is in favour, with lots of other genera of course.

With the methods I use there has been some success at various shows, so I must be doing something right, as I live in the western suburbs of Sydney in all the smog.

ORCHIDS....YESTERDAY, TODAY AND TOMORROW: A DAY SPENT IN THE MERRELLEN BUSHHOUSE

Andree Millar
2/21 Windeyer Street, Thirlmere, NSW.

It is perhaps a contradiction to say that when you step into an orchid grower's house, that time stands still, and yet goes forward with a vision of things to come. But that is what happens when you walk into Merrellen's well-loved bushhouses and talk to Ted and Barbara Gregory. All around you is what they have done with their deep love of conservation by propagation in the rows of healthy little species seedlings, and particularly their results from the line breeding of *Dendrobium kingianum*. Next is another very obvious project, Ted's current research to produce 'antelope' type orchids that will grow cold or without heat, but with protection from frosts.

When Ted says 'antelope', he means using our own section *Spatulata* dendrobiums, that he thinks have been overlooked in breeding programmes. He is thinking about the special shapes, the strength of flowers and spike, the length of bloom life that could, and will, contribute to new hybrids with others of our species.

He began his patient breeding program with one of the only three hybrids he has registered, *Dendrobium* Manning, registered in 1987 after years of experiment and study. It is as we know, a crackerjack, and it is typical of Ted that he called his new baby after the river which was so severely flooded in 1979 that his work, orchid collection, and historical family treasures were all destroyed.

Dendrobium Manning is a cross between *Dendrobium speciosum* var. *speciosum* and a Limberlost hybrid of 1970, *D.* Willowie Gold, which is *D. discolor* x *D. tetragonum.* It was the contribution of shape and colour to the *D. speciosum* that fired Ted's research into his new project. The first step was to look at *D.* Manning with *D.* Gulginni, the latter a cross between *D.* Sunglow and *D. kingianum. D.* Sunglow is *D. speciosum* x *D. fleckeri.* The progeny of this will be crossed back onto *D. speciosum* to make it more cold resistant. This brings the tropical section *Spatulata D. discolor* and the warmer growing *D. tetragonum* into cooler growing *D. speciosum* and *D. kingianum,* with the exquisite shape of *D. fleckeri* to round off the perfection that Ted wants.

Ted has had a long love affair with the *Sarcochilus.* He cherishes the knowledge of where the lovely Orange Blossom orchid, *S. falcatus,* grows on Tambourine Mountain. He will show you with pride the plants growing in the trees in the village streets, and God help you if he or the shopkeepers catch you trying to lift them.

Ted is a man of memories and he never fails to remember the old identities who believed in and helped in conservation and rescue operations. There are many orchid growers today who should give thanks to one of those great men, Stan Beaumont, who witnessed the horrendous logging operations then going on in the Deervale and Dorrigo areas. He salvaged huge bags of *D. falcorostrum* from the debris and sent them on to Ted and Barbara Gregory (then in Taree) who in turn sorted, cleaned, pruned, repacked, and sent them to the dedicated members of ANOS Victoria of twenty years ago. They in turn cared for the plants, and distributed them to their members and other orchidists they knew would love and care for them.

There are many people today who remember Stan Beaumont, and they remember his own personal orchid trees, loaded with as many orchids as they could carry after his return from his rescue operations. All the trees round his home were veritable living orchid homes, and special plants are remembered. Ted and Barbara still have a photo of the rare and lovely pink *S. falcatus* that grew for years, but eventually died in the cruellest of droughts that followed the equally cruel floods.

The Gregorys have most, if not all, of the species of *Sarcochilus* in their bushhouses, especially plants of *S. falcatus,* botanically named for its sickle-shaped leaves, but lovingly named by the orchid world for its sweet scent. These small plants have been there a long time, rescued, not collected, growing mostly on slabs of cork with a few of the older plants on pieces of Antarctic Beech. Some, which have been there a long time, have been transferred to and adapted happily, to large clay saucers.

Ted is happy to pass on his acquired cultivation hints, learned from seeing orchids in the wild. *S. falcatus* does not really like growing in pots, and where they can, the Gregorys give them the growing conditions they like in nature. If the forest is dense, they grow high in the trees, up in the open. If it is clear-growing low scrub, they will flourish near the ground, clinging firmly to their small host branches. Some will grow on cliff faces. In the Merrellen bushhouse, they catch the eye everywhere. Some are high above the benches on cork slabs, others are low down on hanging rails, while still more are in saucers in the coolest section of the bushhouse. All are positioned where their roots can hang free; every plant in a carefully chosen spot where it will grow best.

Sarcochilus is not rare in the more inaccessible places where it grows, and is not uncommon in national parks, a great tribute to the supervision of the NPWLS officers in this part of Queensland. They seed freely and regenerate quickly in natural conditions. Although he does flask many native species, Ted does not do so with *S. falcatus* any more. He did for a time in the 1960's, but they were slow to grow in flasks and also after repotting, and he found he could not compete with the flea markets selling plants stolen from the wild. If thieving ever stops, he will go back to flasking, however time consuming it is, in the interests of having plants available for new growers. He does, however, use his plants in hybridising every year, and remakes the 1966 Ira Butler cross *S.* Melba (*S. falcatus* x *S. hartmannii*) which he considers the best hybrid ever made. He always selects the best parents he has for the remake.

Ted Gregory believes in line breeding and patiently crosses and recrosses the progeny to make a better plant. In *Sarcochilus*, he is concentrating on *S. hartmannii* and *S. ceciliae*. He has trays of small pots and rows of *S. ceciliae* on small 5 x 12 cm slabs of cork, all growing in perfect harmony in the carefully chosen position in which they have been placed. The line breeding shows up in the colour and size of the flowers in each batch, and only the best are kept for breeding.

It was an experience to treasure, spending hours in the Gregory bushhouses; to go back through time and learn of the men who came before him, and to whom he gives so much respect, to hear him speak so well of others' work, and above all, to revel in his plans for the future of the orchids he loves so well.

LINE BREEDING OF AUSTRALIAN DENDROBIUMS

Ted Gregory
Merrellen Orchids, 181 Macdonnell Road, Eagle Heights Qld 4271.

[Ed. - This paper was presented at the First Australasian Native Orchid Conference, September 28-30, 1990, The University of Wollongong, Wollongong, NSW. It is published here with the permission of the author.]

INTRODUCTION

I wonder, have I just been lucky with selfings or can one be classy enough to continue and find that super clone to shape the next generations? Cannot say for sure either way but it's good fun trying.

Most of us who become involved in the growing of orchids seem to get a little egotistic at one stage or other of our careers. By this I mean that, after seeing the marvels that Mother Nature has created over the centuries, all at once the said orchid grower has visions of taking over, or at least helping her out.

I guess I fall into that category as well as anybody else, but I must state that this was not the major reason Barbara and I started to dabble in the breeding of native orchids. We used to spend a lot of time in the bush when our children were young; we were keen amateur geologists, birdwatchers and general plant freaks. And of course orchid watchers, and I must admit collectors of a few good bits as well. The Kew Caldera was always one of our favourite areas because it was only half an hours drive away and was of superb interest both for its orchid population and fabulous lava rock formations.

For years, this area was a fairly safe haven for plants because a fair bit of walking was involved to get to the best spots; but once the area was opened up for modern timber access with roads here, there and everywhere, the situation changed more or less overnight. We were appalled at the rapidity with which whole areas of *Dendrobium kingianum* and various species were almost wiped off the huge boulders and cliff faces by indiscriminate and senseless collection. For years, mentors and friends worked on the rule that if you found a good clone you took a small piece of it and left the rest there to carry on its place in Nature's scheme of things. I guess this line of thought must seem a bit trite in this day and age where greed seems to be the main motivation for many.

LINE BREEDING

After watching all this crazy behaviour for a year or two, we decided that we would try our hand at growing *D. kingianum* to see if we could produce better ones than the average bush plant, with the hope that we could give them to our visitors of those days, and also cut down the need for people to collect from the bush. In those days we were very much hobby growers, with never a thought that one day we would end up going commercial in the same field. I had been a successful breeder of dairy cattle for many years and had had a lot of success with line breeding over quite a period of time. So with a stroke of rare genius (or too much pollen sniffing) I decided if line breeding works with animals, why should it not work with plants as well? More by good luck

I guess than anything else, the first *D. kingianum* we decided to self was a seedling that our son Garry had been given by friends whose farm included a large portion of the Gloucester Bucketts. I suppose I'm a bit biased, but I still think those old hills at the back of my old home town are THE SPOT as far as this species goes.

When we finally got these back from the flasker we gazed at them in awe for a while, and then sent a few of the flasks down south to friends. We then made our first fumbling attempts at growing our first orchid babies. How strange it is to think back to times like these. We now deflask by the thousand and think nothing of it! These must have been incredibly tough seedlings, because, lo and behold, after a few years, they flowered, more credit to their tenacity than to our skill. And, talk about luck (or hopefully good judgement), almost every seedling we flowered was a top clone, far superior to the average plant one would usually see in the bush. Some of the named clones of this crossing include 'Sandon', 'Merrellen No. 1', 'Merrellen No. 2', 'Phoebe', 'Barbara Estelle', and 'Zot'. There are quite a few others that I know of, and perhaps some other good ones floating around in Victoria that I have not seen or heard of. Some people will correspond and tell how their plants flower whilst others will not.

I guess we learnt quite a lot from this first crossing, and the following are some of the pertinent pointers I remember from the exercise.

Because this was a selfing of a flower that was a fairly rich overall red, I had expected quite a proportion of reds. How wrong I was. Almost all of the plants we kept flowered a typical *D. kingianum* colour. In fact, most of them looked like improved versions of that old stalwart *D. kingianum* 'Albert West'. I only flowered one myself anywhere near the colour of the parent, and at that time I was not particularly interested in plant genetics and gave the plant to someone who admired it one day. As my interests stand now, I wish I knew whom I had given it to, so I could borrow a piece back to trial with, or at least get a good slide of it for our records. Overall, the spike habit was very good, with the flowers nice and upright and well clear of the foliage. Flower count was quite fair, running from seven to fourteen, sixteen on a couple. Most were a bit early in flowering, coming in about the same time as *D. kingianum* 'Corrigan's Red', which flowers early August on Tamborine Mountain.

One trait that was not noticeable in the parent

Dendrobium **Manning 'Linda'** (*D. speciosum* var. *speciosum* x *D.* Willowie Gold). Photo. T. Gregory.

Sarcochilus falcatus specimen in the Merrellen bushhouse. Photo. T. Gregory.

was that most of the seedlings formed kiekies rather freely, which is not a desirable characteristic in my way of thinking.

Selfing of *Dendrobium kingianum* 'Merrellen No. 1': I thought 'Merrellen No. 1' was really something the first time we flowered it. It was still in a 2-inch pot and only had three flowers on each spike, but they were just over 38 mm across, and with a very vivid labellum. At the sight of this flower, I thought, "What the heck!! Let's self this and see what happens this time around."

As you might gather, a few years had passed by from the time that we made the first selfing that led to 'Merrellen No. 1'. Our situation had changed from a large hobbyist at Taree in NSW to a small commercial nursery on Tamborine Mountain in Queensland. The end result of this was that, when the selfings of 'Merrellen No. 1' came back to us, they were deflasked, grown on, and then listed as our No. 120 cross in our annual price list. As most of us know, not everything listed by a grower will sell. Some just do not click with the customer and just continue to take up benchspace. When the seedlings started to flower, we were absolutely delighted that we had not sold them all out; this selfing has produced some of the best *D. kingianum* that I have seen to date.

Also, this second selfing has let loose an odd gene or two, because over half the seedlings we have flowered to date are large whites with red labellums. I have produced whites and shell pinks before, but nothing with the size and texture of this batch. The other half of this selfing are very like their parent; quite a few are bigger and most have the intense lip colour. We have also had feedback from customers who bought some of the batch and their results have been similar to ours. Some of them are so beautiful that we named them after their first flowering. I guest this is a bit rash as I normally like to flower a clone a couple of times before putting a name on it. But when you see a seedling over 42 mm across, it's a bit hard not to get pollen fever! 'Linda' and 'Sue' are the best we have flowered till now, with 'Lauren' not far behind.

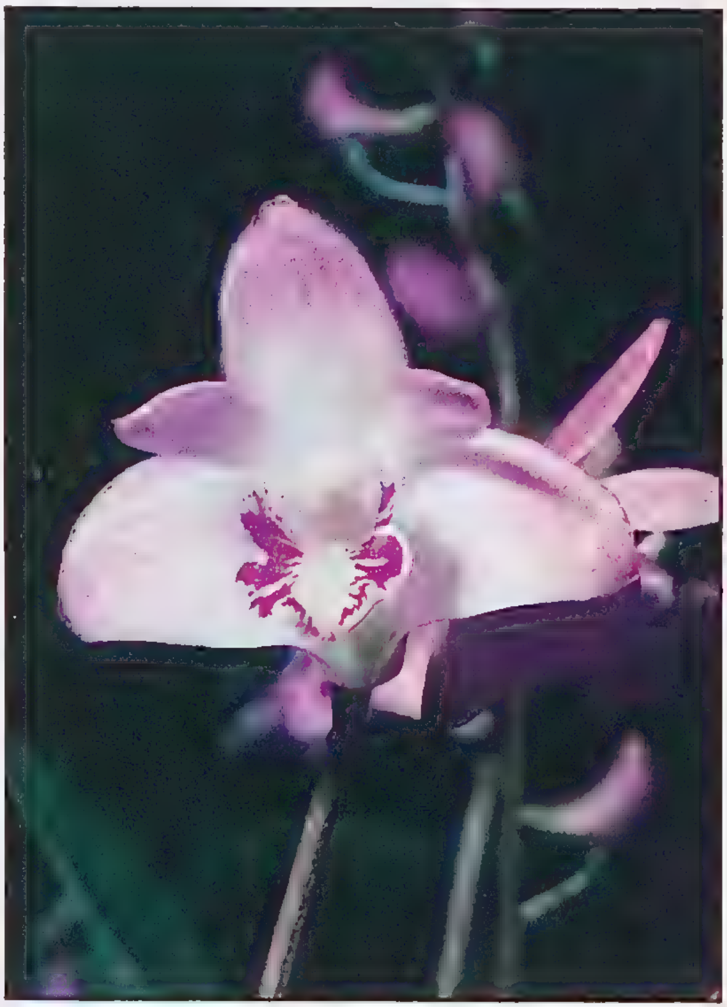
I wonder what we will get out of the selfings of these superb white *D. kingianum*? Have we reached the end of the road or are there some super seedlings yet to come?

After seeing the results of selfing *D. kingianum* 'Merrellen No. 1', friends and I have selfed 'Sandon' and 'Zot'. In their own way, these clones have superior features to 'Merrellen No. 1'. 'Zot' is a very round flower with good habit and flower count, while 'Sandon' has up to sixteen big flowers per scape, which puts it on a par with 'Barbara Estelle'.

Selfing of *Dendrobium kingianum* 'Corrigan's Red': Another *D. kingianum* which has always interested me is 'Corrigan's Red' which has been famous round the traps for years. It interests me even more now that I live only a couple of gullies from where it was found.

As a natural clone, 'Corrigan's Red' has quite a lot going for it. Among its best features are early and regular flowering, a fair flower count, and great spike habit. The only real minus is the fact that the flowers are fairly small, the feature that caused me to look past this clone in the early days of our breeding.

But after the success of the selfing of 'Merrellen No. 1', I looked at 'Corrigan's Red' again and decided there were more pluses than minuses present. So why not try another selfing and see what happens this time. After all, it's only another 3 or 4 years to prove it out, and what's a few years here and there to a hayseed with a terminal case of pollen fever.



***Dendrobium kingianum* 'Zot'.**
Photo. T. Gregory.

So the selfing was duly done, the seed sown, and so on until these little devils started to flower for us. We were not so fortunate with these as we were with the selfing of 'Merrellen No. 1'; fortunately (or unfortunately, depending which way you look at these situations) the seedlings were almost sold right out before they started to flower. Of the few that we managed to see flower, the biggest surprise was in the size of flower; most of them flowered much larger than their famous parent. This bonus was matched with the fact that habit and colour came marching through as well.

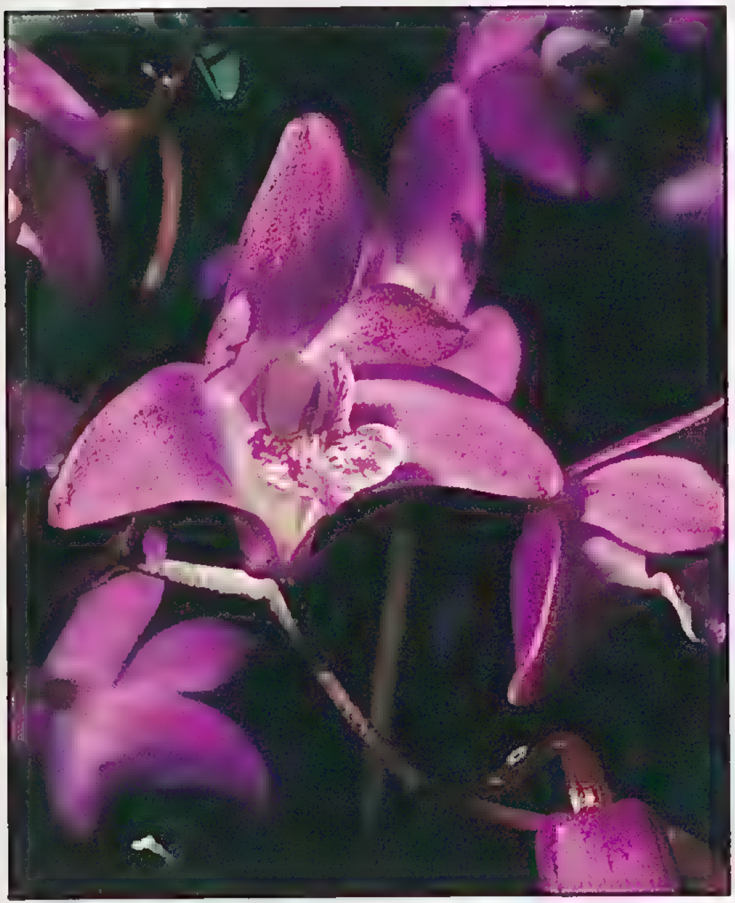
These seedlings were very vigorous growers as well, which is in contrast to 'Corrigan's Red' which has always been a rather tardy grower under my culture.

The two examples we have dealt with here were done just looking for overall improvement in *D. kingianum* without looking to any specific feature in that improvement, such as colour. The colour that interested us most in the early days was the so-called red *D. kingianum*. To me, that is a bit of an illusion. I cannot see these little gems as a pure red as in a *Sophronities*, but more as an intense purple. However, amongst *D. kingianum* freaks they will always be reds so I'll call them such from here on.

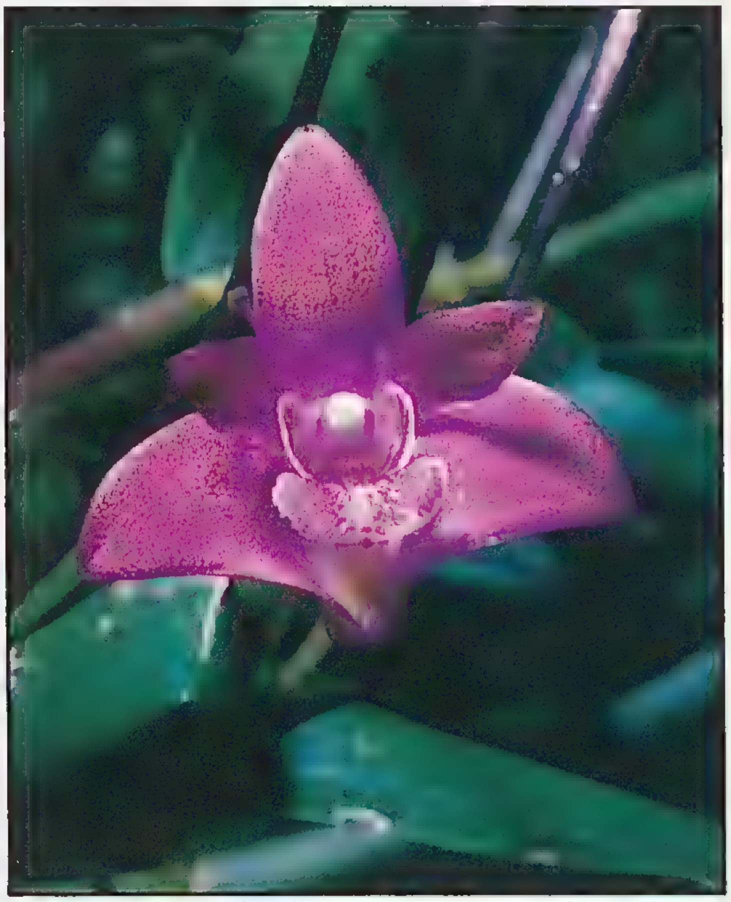
The programme for improving the reds started years ago amongst lifelong friends Harry Klose, Alwyn Flanagan and Alan Garrett, and later Rod Graham, all of Wauchope, the Timber Town. These sort of group experiments are wonderful things. They create common interest and friendship, and help in growing the number of seedlings needed to prove a cross out.

With orchid breeding, the crunch is the time that it takes to find the dominant features in any clone, and then the time it takes to see what will dominate what in the next crossing. When you allow four or five years to properly prove out a cross, you are looking at fairly steady progress.

However, after all these years, we can almost guarantee reds out of a lot of our crosses, and that alone makes it worthwhile. I guess there are other groups round the country working on different facets in the field of improving *D. kingianum*. Some say we will see blues and yellows in the near future. It's amazing what we humans can do once we set our hearts towards a goal. This just goes to show the width of the field we work in, and the range of goals there to be pursued. Also it shows the range of tastes and desires among us; yellow and blue are both as beautiful as any red, but not of greater interest to me personally. Yet I madly pursue that elusive red to beat all reds. I guess that's just what you call good old-fashioned human nature.



Dendrobium kingianum **'Merrellen No. 2'.**
Photo. T. Gregory.



Dendrobium kingianum **'Merrellen No. 3'.**
Photo. T. Gregory.

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 1: *Spiranthes sinensis* (Pers.) Ames

Common Name: Austral Ladies Tresses

Subfamily: *Spiranthoideae*
Tribe: *Cranichideae*
Subtribe: *Spiranthinae*
Genus: *Spiranthes* Richards

Distribution: *Spiranthes* is a widespread genus mainly from the temperate zones; North and South America, Asia and Australasia. *S. sinensis* is possibly the most widespread of all orchids, occurring from the Himalayan mountains and China to Australia and New Zealand. It is found in all Australian states except Western Australia and the Northern Territory.

Features: The genus was described in 1817 by Louis Richards and is characterised by the flowers being arranged spirally on the flowering stem (Greek, *speira*, spiral, twisted; *anthos*, a flower). *Spiranthes* species are usually evergreen terrestrials, which occasionally have a short deciduous period after flowering. *Spiranthes sinensis* has several narrow leaves at ground level and several scale-like leaves on the stem. The plant varies in height from 15 to 45 cm, with the leaves up to 16 cm long. The flowers are 5 to 8 mm in diameter with pink petals and sepals and a white labellum. The natural flowering period is summer, January to March, and the native habitat of *S. sinensis* is in very moist areas particularly around the edges of swamps.

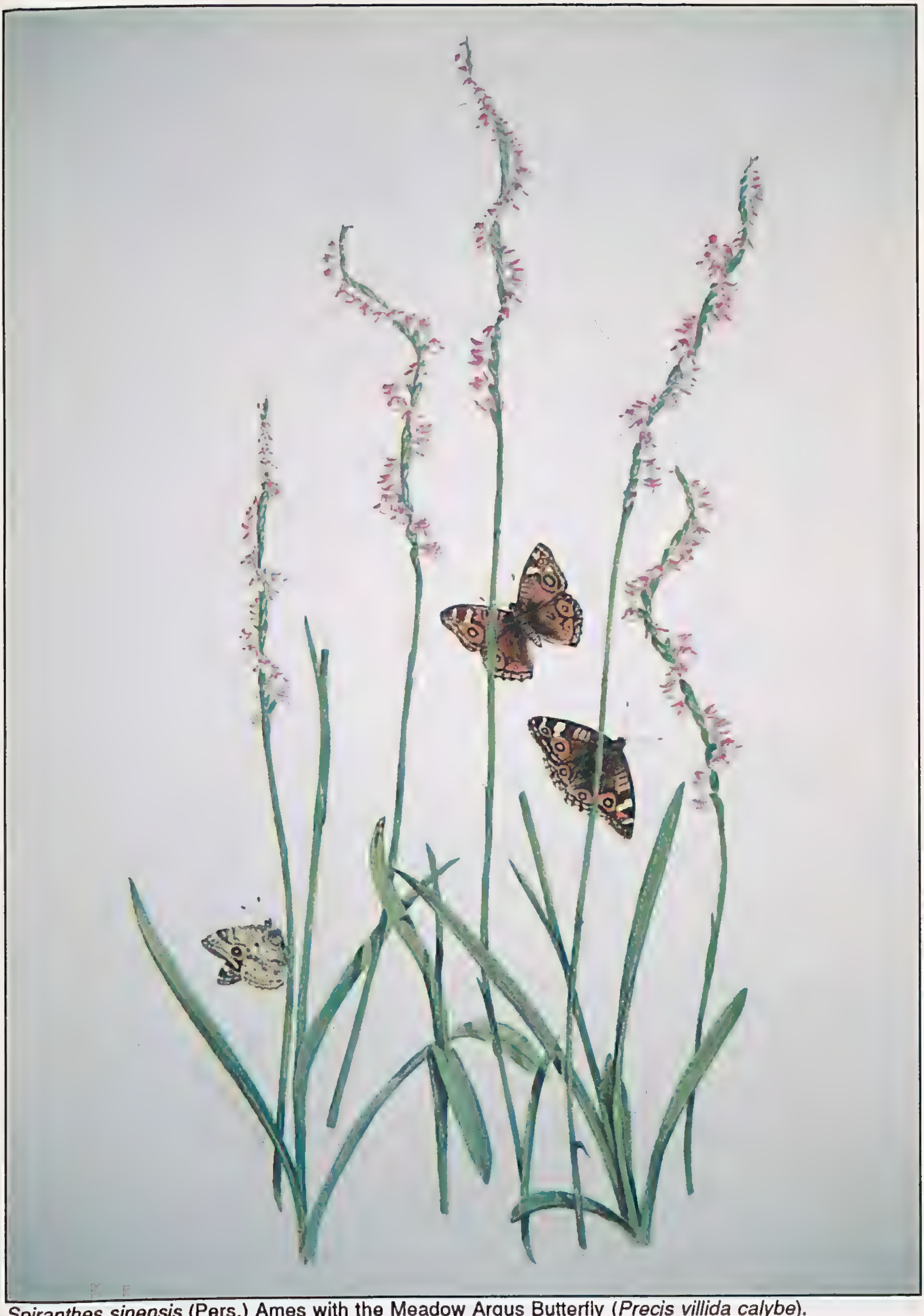
Pollination: Most *Spiranthes* species are pollinated by bumblebees, halictid bees, and megachilid bees. Reports on the pollination of *S. sinensis* identify the Meadow Argus Butterfly (*Precis villida calybe*) and small native bees as possible pollinators.

Conservation Status: This species is not considered to be under threat.

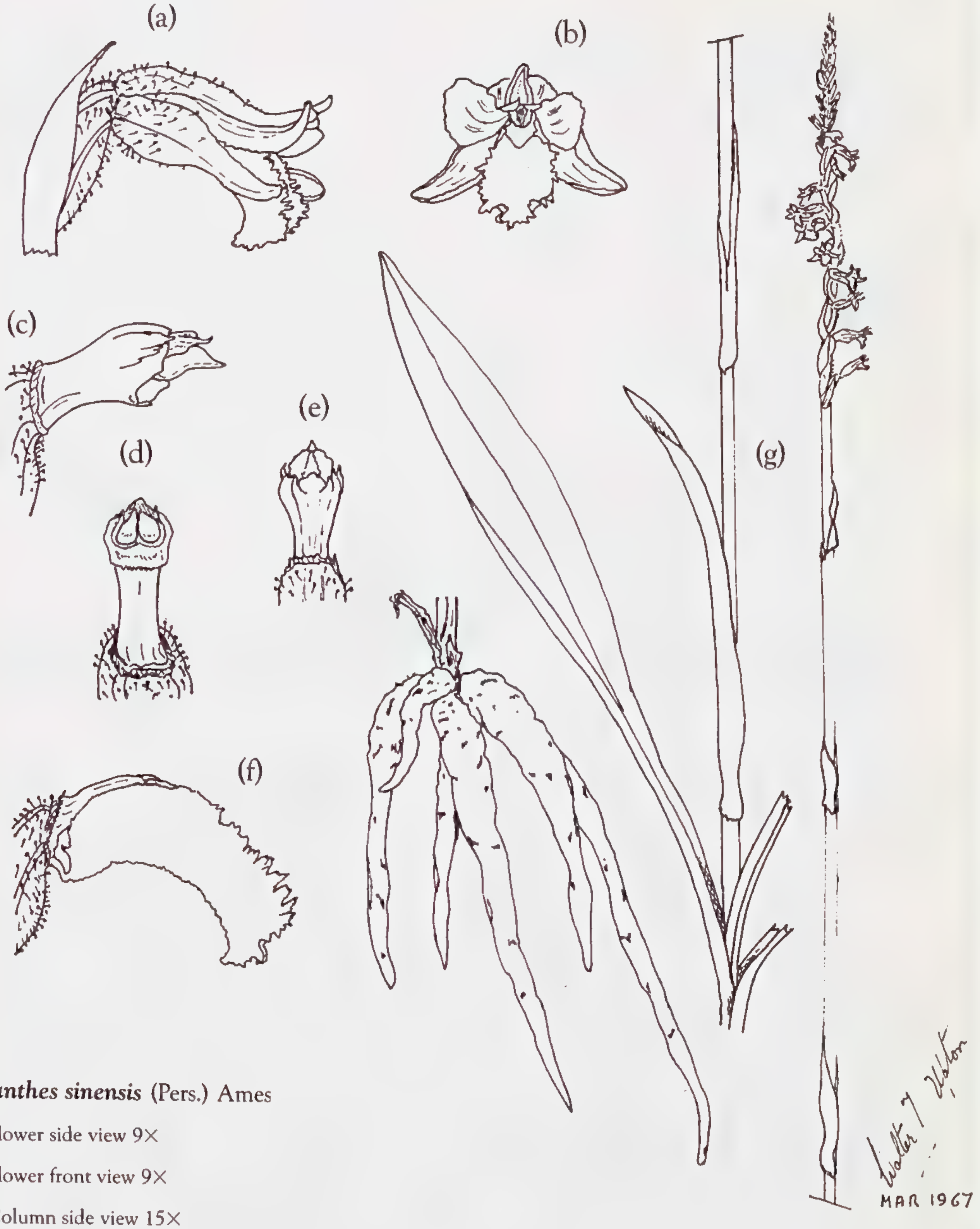
Culture: This orchid will grow well in a cold glasshouse in Southern Australia, and elsewhere in a bushhouse, provided the pot is well watered all year round. Use a basic terrestrial soil mix and light shade. Vegetative propagation is slow, although many clones will self-pollinate and set seed.

Illustration: Illustrated are plants and flowering stems of *S. sinensis*; note the spiral arrangement of flowers on the stem. The Meadow Argus Butterfly (*Precis villida calybe*) can be seen on three flowering stems.

Description by Tony Slater, 159A Faleigh Street, Thornbury, Vic. 3071
Illustration by Helene Wild, 56 Civic Parade, Seaholme, Vic. 3018
Line drawings by Walter T. Upton, PO Box 215, West Gosford, NSW 2250.



Spiranthes sinensis (Pers.) Ames with the Meadow Argus Butterfly (*Precis villida calybe*).
From a painting by Helene Wild.



Spiranthes sinensis (Pers.) Ames

(a) Flower side view 9×

(b) Flower front view 9×

(c) Column side view 15×

(d) Column front view 15×

(e) Column rear view 15×

(f) Column & labellum side view 12

(g) Plant 1½×

Spiranthes sinensis (Pers.) Ames. From a line drawing by Walter T. Upton.

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- **ANOS Townsville Group,** Hon. Secretary, P O Box 326, Townsville QLD 4810. Tel: (077) 78 4311. Meetings 8 pm on 1st Tuesday each month, Townsville Orchid Society Hall, Pioneer Park, Ross River Rd, Kirwan.

- **ANOS Wide Bay Group,** Hon. Secretary, 116 Gympie Rd., Tinana QLD 4650. Tel: (071) 215 224. Meetings monthly (7.30 pm on 3rd Thursday of odd numbered months; 11 am on 4th Sunday of even numbered months), Neighbourhood Centre, Bazaar St., Maryborough.

- **KABI (South-east Qld) ANOS Group,** Hon. Secretary, Iona Rd., Beerburrum QLD 4517. Tel: (074) 960 131.

- **Native Orchid Society of Queensland,** Hon. Secretary, P O Box 159, Broadway QLD 4000. Tel: (07) 264 3897. Meetings 8 pm on 1st Monday each month, Bread House, 49 Gregory Terrace, Brisbane.

- **Native Orchid Society of Toowoomba Inc.,** Hon. Secretary, P O Box 2141, Toowoomba QLD 4350. Meetings 7.30 pm 1st Friday each month, Red Cross Hall, Hall Lane (off Neil Street), Toowoomba.

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- **ANOS Newcastle Group Inc.,** Hon. Secretary, 9 Yvonne Close, Belmont North NSW 2280. Tel: (049) 48 6462. Meetings on 4th Wednesday each month, John Young Community Centre, Thomas St, Cardiff.

- **ANOS Port Hacking Group,** Hon. Secretary, P O Box 359, Gymea NSW 2227. Tel: (02) 524 9996. Meetings 8 pm on 4th Wednesday each month, Community Hall, Gymea Bay Rd, Gymea.

- **ANOS Sydney Group Inc.,** Hon. Secretary, 51 Waratah Rd, Turramurra NSW 2074. Tel: (02) 449 9593. Meetings 8 pm on 3rd Friday each month, Baulkham Hills Community Centre, Baulkham Hills.

- **ANOS Warringah Group Inc.,** Hon. Secretary, P O Box 524, Dee Why NSW 2099. Tel: (02) 99 2468. Meetings 8 pm on 2nd Thursday each month, Thomas Vicars Mem. Hall, corner of Pitt & Grainger Rds, North Curl Curl.

- **Wollongong & District Native Orchid Society Inc.,** Hon. Secretary, 13 Eleanor Ave, Oak Flats NSW 2529. Tel: (042) 56 1608. Meetings 7 pm on 2nd Tuesday each month, Wollongong High School, Common Room, Lysaght St, Fairy Meadow.

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- **ANOS Victorian Group Inc.,** Hon. Secretary, P O Box 285, Cheltenham VIC 3192. Tel: (03) 583 4278. Meetings 8 pm on 1st Friday each month, National Herbarium, Royal Botanic Gardens, Birdwood Ave, South Yarra (behind the Shrine).

- **ANOS Geelong Group Inc.,** ANOS Lot 2, Newcombe St, Drysdale VIC 3222. Tel: (052) 51 3186. Meetings on 2nd Wednesday each month, Fidelity Hall, Star St, Geelong.

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- **Native Orchid Society of South Australia Inc.,** Hon. Secretary, P O Box 565, Unley SA 5061. Tel: (08) 278 2917 or (08) 297 3724. Meetings on 4th Tuesday each month, St Matthew's Hall, 67 Bridge St, Kensington.

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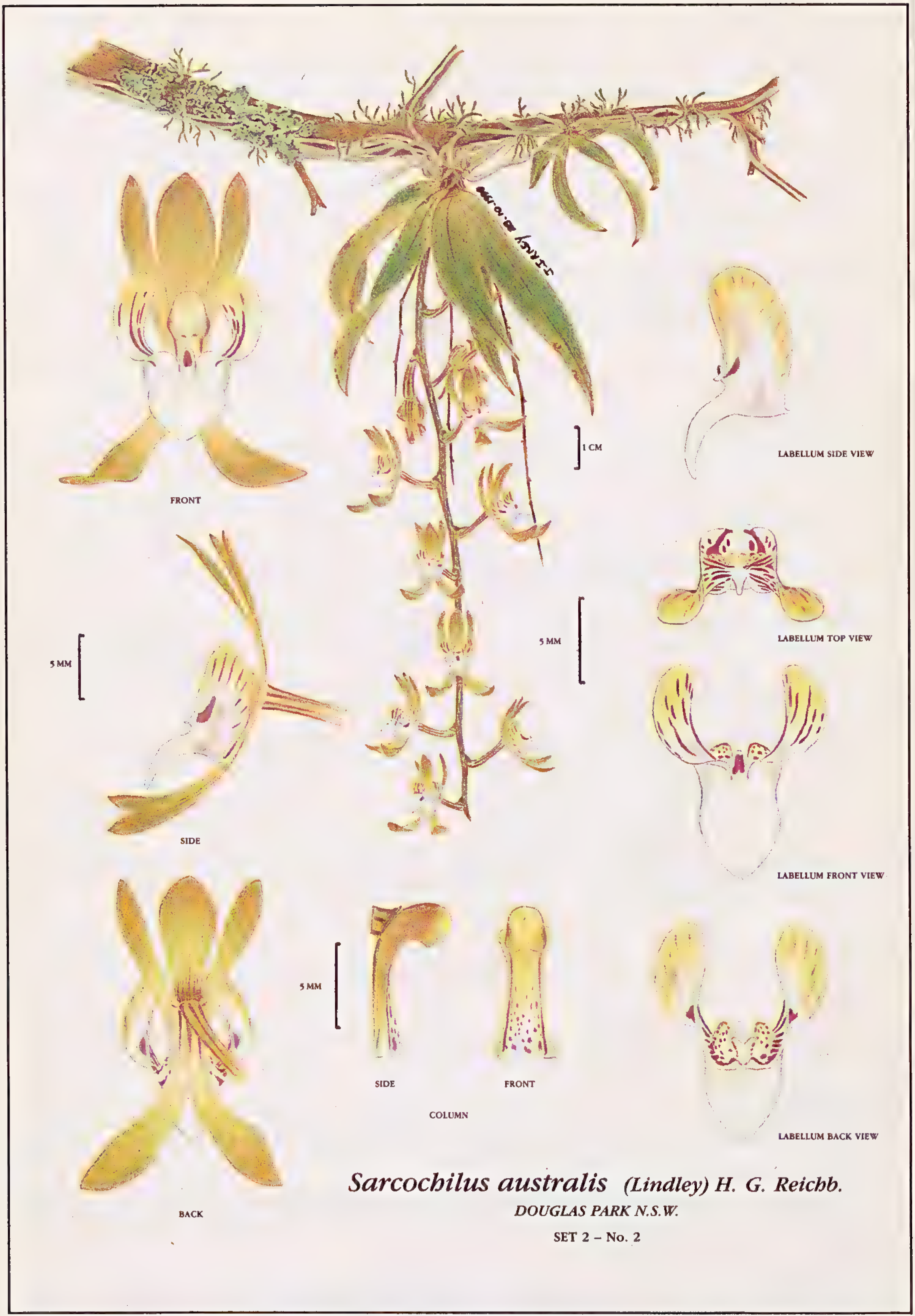
- **West Australian Native Orchid Study & Conservation Group (Inc.),** Hon. Secretary, P O Box 323, Victoria Park WA 6100. Tel: (09) 378 1278. Meetings on 3rd Wednesday each month, Kings Park Board Administration Centre Theatrette, Kings Park, West Perth.

NEW ZEALAND

- **New Zealand Native Orchid Group,** Convenor, 45 Cargill St, Dunedin, New Zealand.



Sarcochilus australis (Lindley) H.G. Reichb. from a painting by J.J. Riley

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The Orchadian

Volume 10, Number 6
Summer 1992

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TALKING POINT

Australasian Orchids Illustrated

Mair Swann and Helene Wild presented me with a problem when they offered me slides of some of their paintings for reproduction in *The Orchadian*. The problem was, "How to make the best use of such welcome offers, while achieving something more than just a rendition of a beautiful painting on a front or rear cover".

Then then germ of an idea arose. For many years I have admired the series of articles called *Orchid Genera Illustrated* that Tom and Marion Sheehan have produced for the *American Orchid Society Bulletin.* This series, now past the 140 mark, features a brief description of the genus, probably by Tom Sheehan, and a painting of a typical member of that genus by Marion Sheehan.

Why not do something similar in *The Orchadian*? With the willing participation of Helene Wild, Mair Swann, and possibly other botanical artists, we could reproduce a botanically correct painting of many of the native orchids in Australasia. By supplementing the paintings with line drawings provided by the likes of Walter Upton, we could have a series that goes on almost for ever, provided we could persuade somebody to supply technically correct descriptions of the illustrated species. Tony Slater had filled this niche for the moment, but others may be able to assist in later issues.

We commenced with *Spiranthes sinensis* (Pers.) Ames in the spring issue, and continue in the present issue with *Pterostylis curta* R. Br.

It is somewhat fitting, therefore, that Helene Wild recounts in this issue, how she came to paint orchids. When the need arose to identify a terrestrial species unknown to her as a new member of the ANOS fraternity, Helene dusted off her childhood paintbox to illustrate the plant. That orchid was *Pterostylis curta.* Some time later, when painting *Spiranthes sinensis*, Helene developed her distinctive style of incorporating butterflies with flowering native orchids.

I hope you like the idea of *Australasian Orchids Illustrated*, and of reading how Helene Wild achieved one of her ambitions in life.

Drawings by J.J. Riley

John Riley is another member of ANOS who draws and paints native orchids. He has graciously made available a series of prints of some of his paintings to ANOS Council. These prints can be obtained from the ANOS Treasurer (see advertisement on centre page) with the proceeds going towards servicing the needs of the ANOS membership. To illustrate the quality of this offer, this issue shows an illustration of *Dendrobium striolatum* H.G. Reichb.

Noel J Grundon

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THE ORCHADIAN

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- from a painting by J.J. Riley.

SHOW REPORTS

[Ed. - Due to present taxonomic uncertainty in the names of a number of species within the *Sarcanthinae*, the parentage of hybrids has been listed as currently accepted by the International Registration Authority for Orchid Hybrids. Thus, *Parasarcochilus hirticalcar* (name for IRAOH) = *Pteroceras hirticalcar* = *Sarcochilus hirticalcar*, and *Parasarcochilus spathulatus* (name for IRAOH) = *Pteroceras spathulatus* = *Sarcochilus spathulatus.*]

ANOS NEWCASTLE GROUP INC. *SARCANTHINAE* SHOW

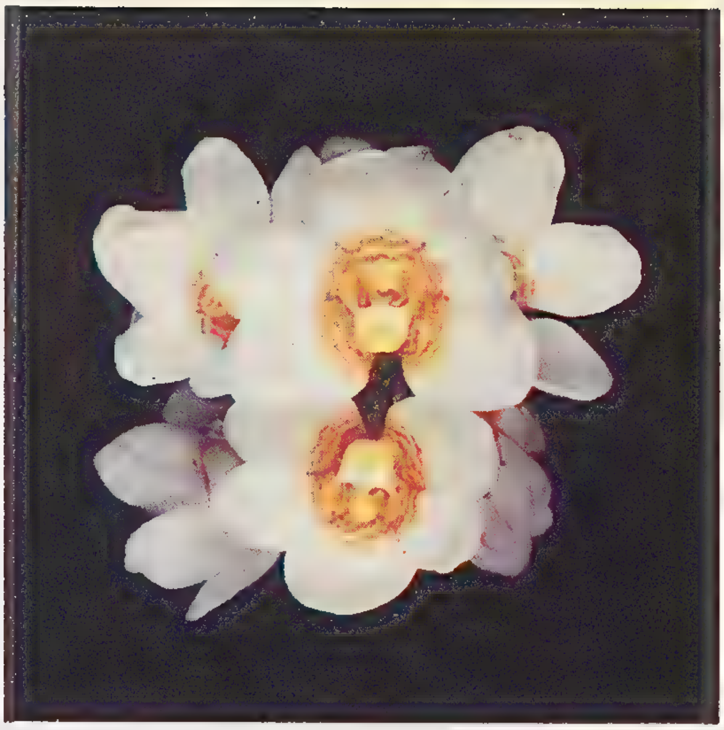
by Peter Vaughan

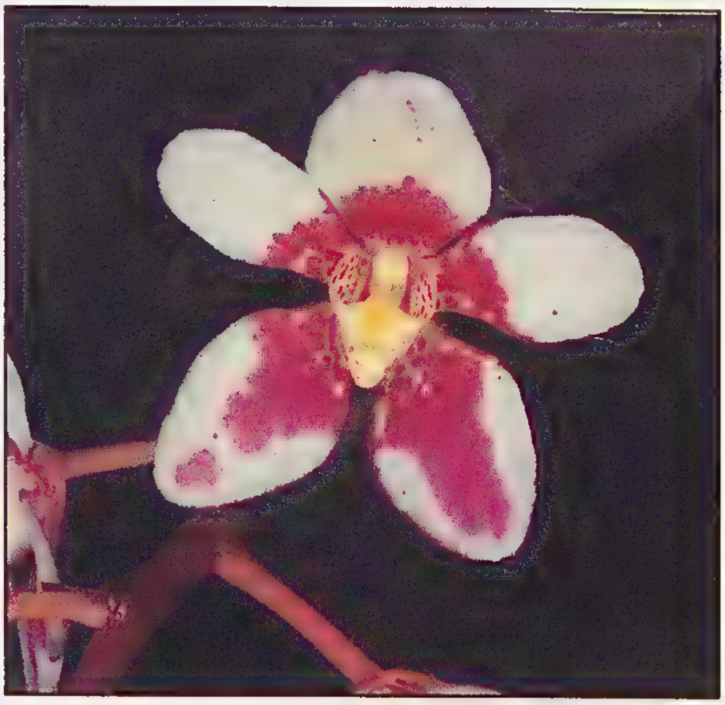
The Newcastle Group of ANOS held their annual *Sarcanthinae* Show on 17 - 19 October, 1991. The venue, Lake Fair Shopping Centre at Mt Hutton, again proved a success.

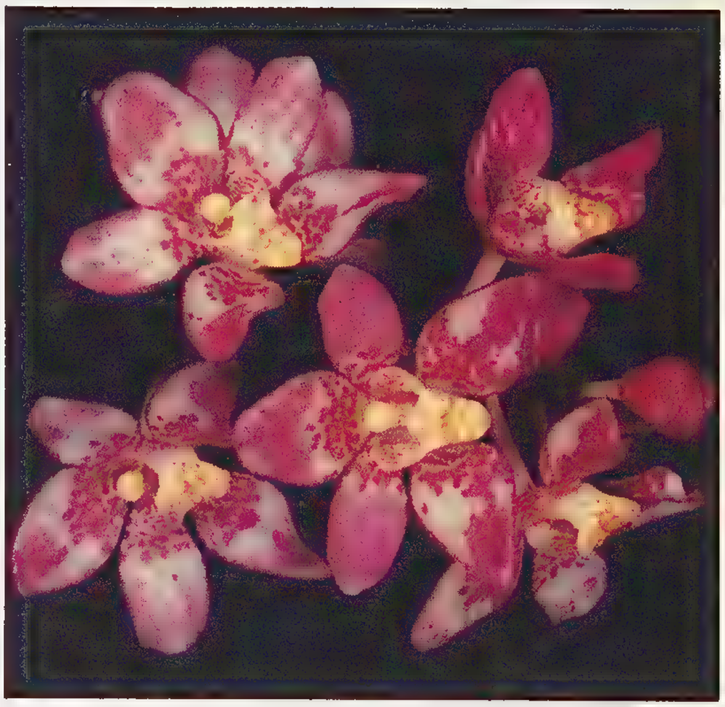
The show was well supported by members, resulting in some difficult decisions for the judges. The *Sarcochilus hartmannii* benching had some excellent plants despite the extreme heat and bushfires the previous two days. One plant that created a lot of interest was a plant that originated from the Numinbah Valley. This plant has been named *S. hartmannii* 'N.V. Yellow Snow'. It is a natural *lutino* form of *S. hartmannii* where the red in the centre has been replaced by yellow pigmentation.

Brightly coloured hybrids were well represented and popular. *Parachilus* ((*Pch.* Perky x *S. hartmannii*) x *S. fitzgeraldii*) was spectacular with triangular red markings. The flowers opened very flat and were well presented. Strong, clear colours are a feature of this plant. In contrast, *Parachilus* Elizabeth x *Parasarcochilus spathulatus* has more diffuse colours. This may be caused by the *Psarco. spathulatus* influence, which also produced a larger labellum in the hybrid.

It is not often that the Americans are ahead of us in hybridising our native orchids. However, they







Top: *Sarcochilus hartmannii* 'N.V. Yellow Snow'. **Middle:** *Parachilus* ((*Parachilus* Perky x *Sarcochilus hartmannii*) x *Sarcochilus fitzgeraldii*). **Bottom:** *Parachilus* Elizabeth x *Parasarcochilus spathulatus.* All plants owned and grown by Neil Finch. Photos Peter Vaughan. Plants displayed at ANOS Newcastle Group Inc. *Sarcanthinae* Show.

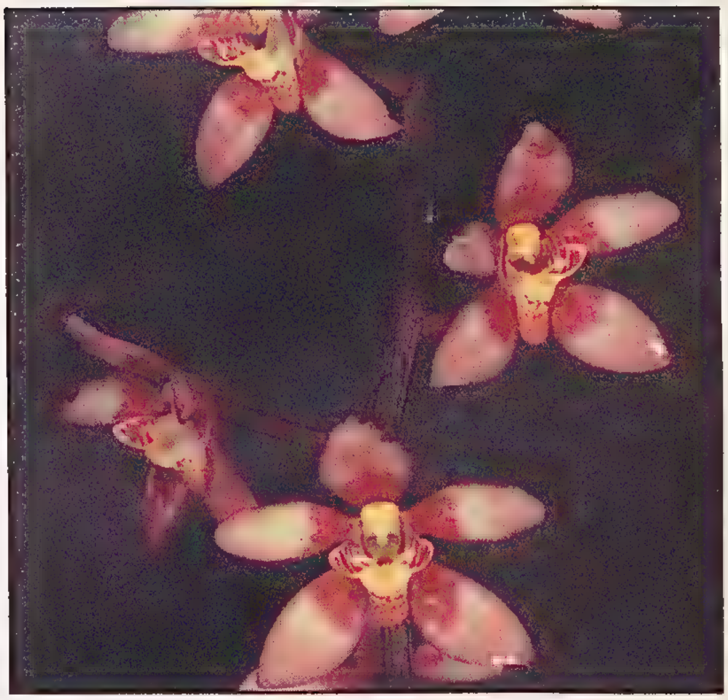
were in the case with *Plectochilus* Richard Jost (*S. hartmannii* x *Plectorrhiza tridentata*) which was registered in USA in 1976, and was not seen in Australia until Neil Finch remade it. By using an outstanding clone of *Plrhz. tridentata*, Neil has created hybrids that are gaining attention. The colour ranges from reds through to burnt orange, and may be evenly dispersed or confined to a band on the extremities of the petals and sepals. Another significant advantage of this hybrid is the habit of flowering from all nodes (a feature of *Plrhz. tridentata*).

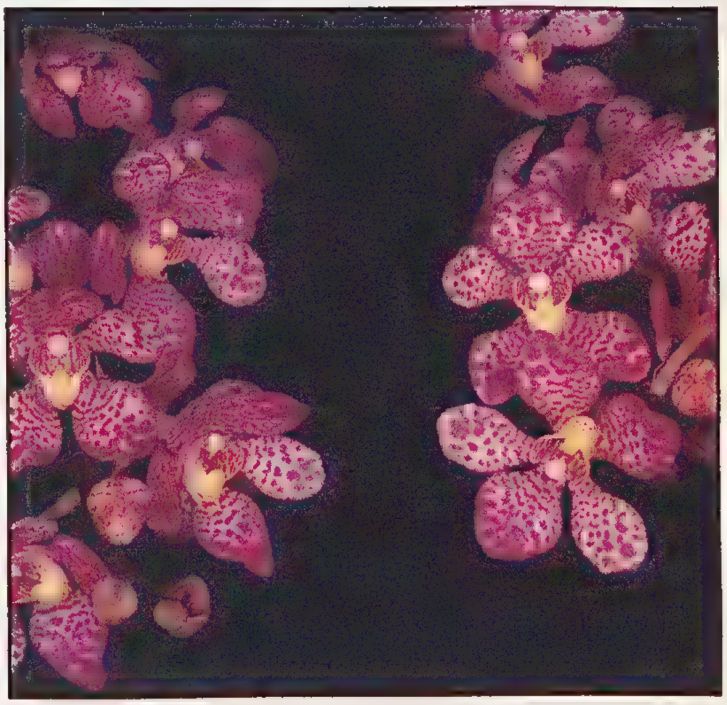
Neil Finch also displayed an excellent plant of *S.* Elizabeth. This hybrid has *S. hartmannii, S. ceciliae* and *S. fitzgeraldii* in its parentage. I always wonder where the spotting originates.

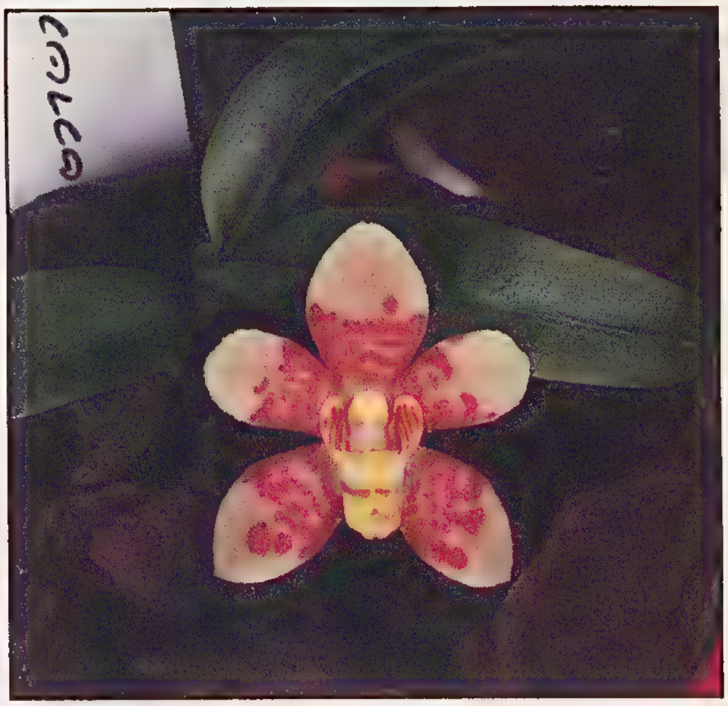
The last plant I will discuss was considered by many to be the plant of the show. It is *Parachilus* ((*S. ceciliae* x *Psarco. hirticalcar*) x *Parachilus* Riverdene). The plants are flowering well just 12 months out of flask. The plant of *Prch.* Riverdene that was used as a parent has been in flower for the past 18 months. This plant often carries up to ten flowers open at a time as it flowers progressively along the spikes. The individual flowers often last as long as four weeks, a *Psarco. hirticalcar* feature.

The results of the show were:

Champion Native Species Orchid: *Sarcochilus hartmannii*, owners Neil and Meg Finch.
Champion Native Hybrid Orchid: *Plectochilus* Kilgra, owners Neil and Meg Finch.
Champion Specimen Orchid: *Sarcochilus* Weinhart, owner John Larkey.
Bill Murdoch Memorial Shield: Champion *Sarcanthinae*; *Plectochilus* Kilgra, owners Neil and Meg Finch.
Bill Murdoch Memorial Shield: Champion *Dendrobium*; *Dendrobium discolor*, owner Peter Presland.







Top: *Plectochilus* Richard Jost.
Middle: *Sarcochilus* Elizabeth.
Bottom: *Parachilus* ((*Sarcochilus ceciliae* x *Parasarcochilus hirticalcar*) x *Parachilus* Riverdene). All plants owned and grown by Meg and Neil Finch. Photos Peter Vaughan. Plants displayed at ANOS Newcastle Group Inc. *Sarcanthinae* Show.

ANOS SYDNEY GROUP INC. SPRING SHOW

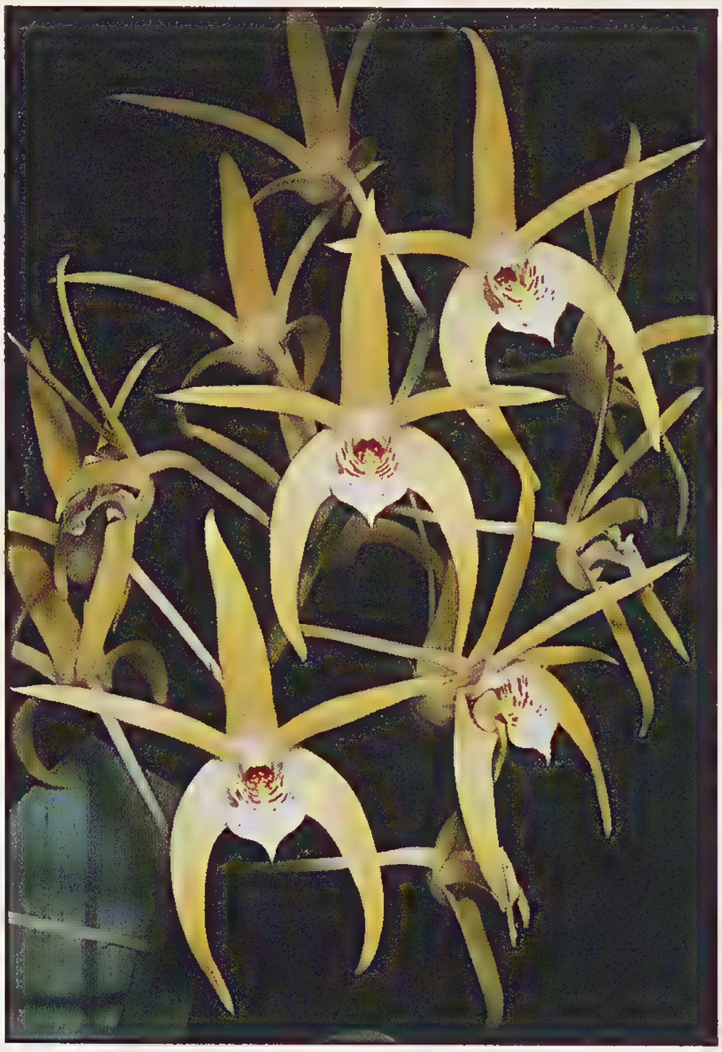
by Michael Harrison

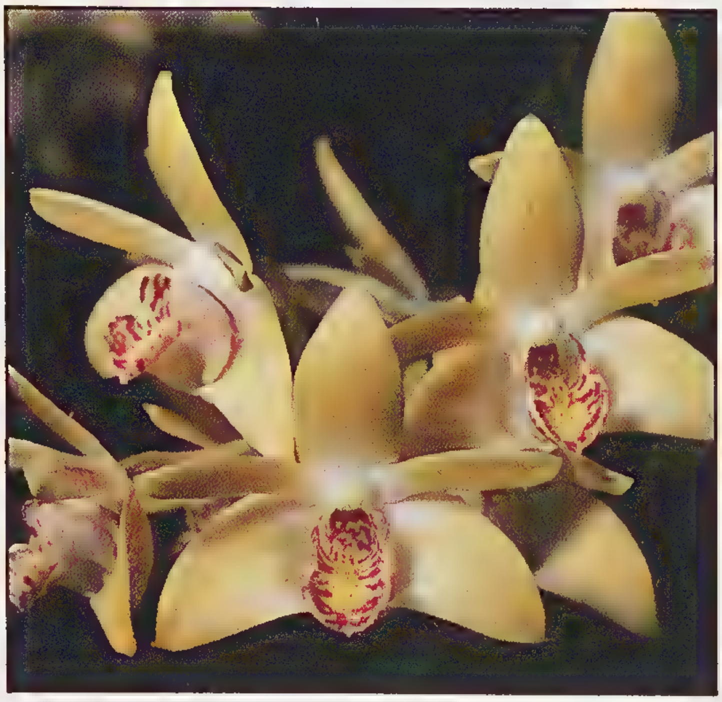
The 9th Annual ANOS Sydney Group Inc. Spring Show, held on 21 - 22 September 1991 at Baulkham Hills Community Centre, was a great success, and a credit to the Group's management and members.

As a spectacle of Australasian native orchids, the show certainly achieved its aims, and many a visitor commented on the overall impact of so many flowering plants together in one place. For the connoisseur, the event was unsurpassed as a showcase for quality orchids, with many of the best contemporary hybrids and the finest species on display.

Dendrobium Star of Riverdene (*D.* Star of Gold x *D. speciosum*) was the hybrid of the show this year, and there were a number of plants present on the benches. However, it was the one exhibited by David Butler that was assessed by the judges to be Champion Hybrid of the Show. It was a marvellous plant, with two perfectly erect inflorescences carrying widely opening, clear yellow flowers, which displayed themselves beautifully on the raceme. Fittingly, it was benched in the First Flowered Seedling Hybrid Section which, when you think about it, really is where the finest "new" hybrids should be appearing each year. *D.* Star of Riverdene is the result of Sid Batchelor's breeding and is an outstanding example of the art of the hybridist. Another fine plant of *D.* Star of Riverdene, exhibited by Norm Biffin, took out first place in Section 20, Best *Dendrobium* Hybrid Without *D. kingianum* Parentage.

Elsewhere in the show, other growers made their presence felt with some excellent hybrids. Sid Batchelor produced several plants of his *D.* Yondi Glow (*D.* Hilda Poxon x *D.* Peach Glow) with large, round flowers in shades of pink and soft apricot, and also *D.* Yondi Pioneer (*D.* Aussie Bonanza x *D.* Star of Gold), a cross which is producing some of the best orange hybrids to date. Neil Finch won in the *Sarcanthinae* Hybrid Section with one of his *Plectorrhiza tridentata* x *Sarcochilus australis*, a plant with widely opening, dark chocolate flowers about 10 mm tall, and Bernie Fletcher benched a marvellous Ken Russell-made hybrid, *Dendrobium* ((*D.* Graham Hewitt x *D.* Kingrose) x *D.* Peter), with large, flat, pure crystalline white flowers, of very heavy





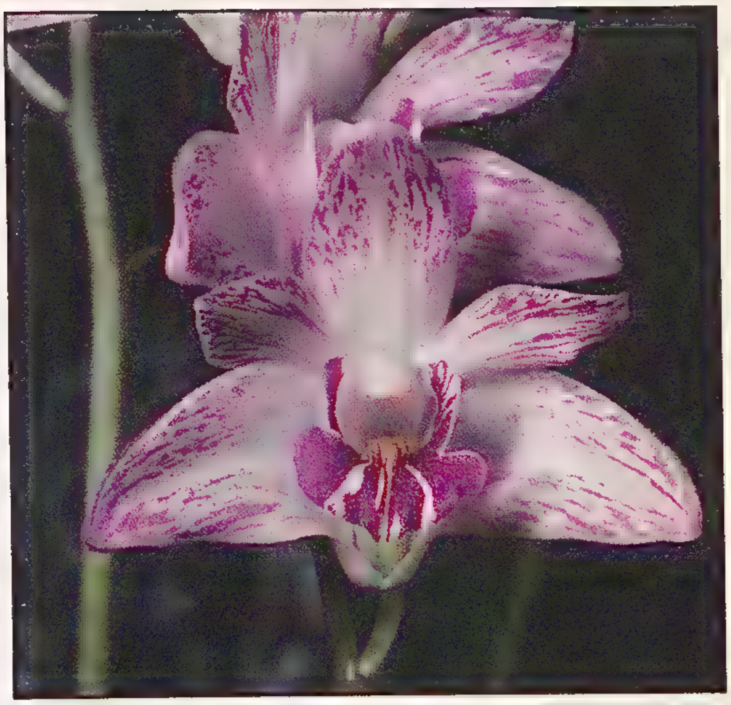
Top: *Dendrobium* Star of Riverdene; Champion Hybrid of Show, ANOS Sydney Group Inc. Spring Show. Owned and grown by David Butler.
Bottom: *Dendrobium* Yondi Glow 'Peachy'. Owned and grown by Sid Batchelor.
Photos David Titmuss.

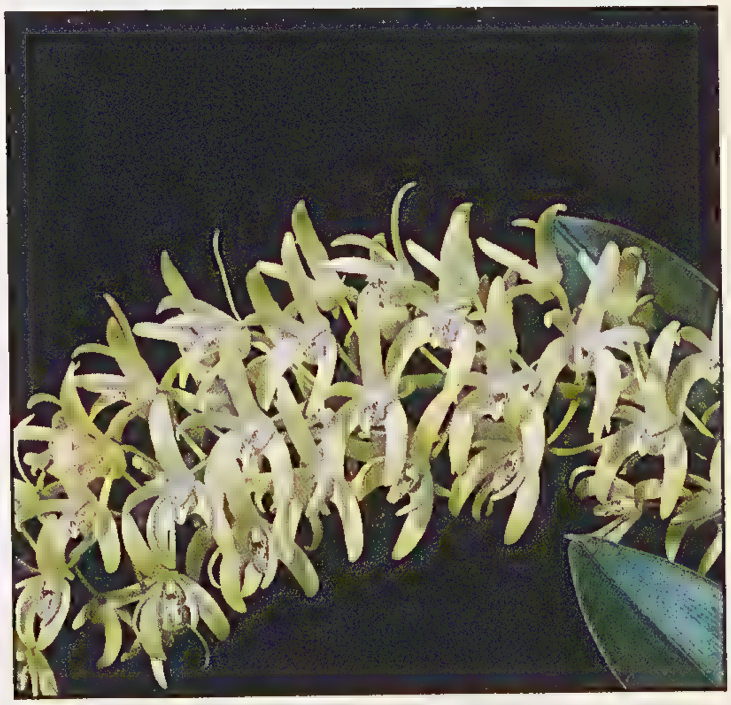
substance, carried on upright racemes.

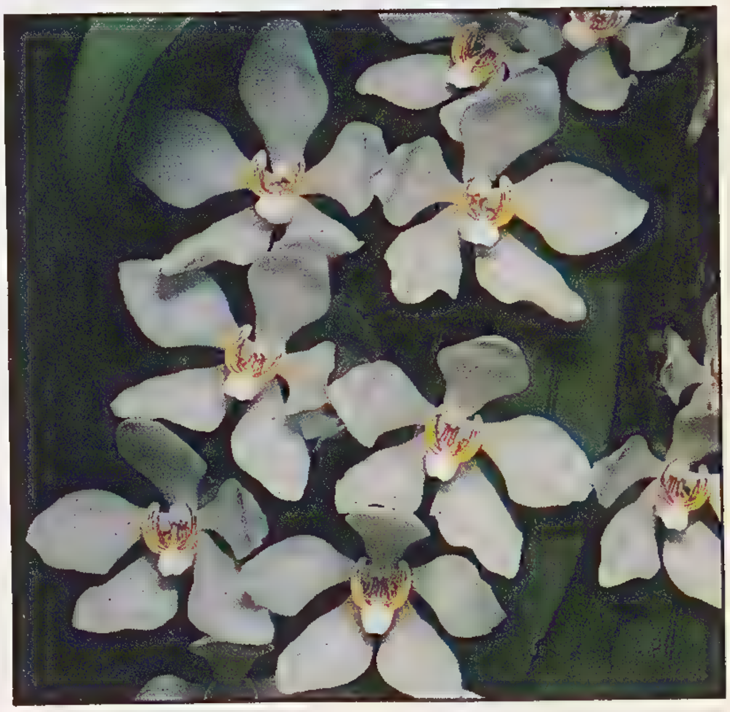
One of the real successes of the show was a newly introduced section, "Best Classic Hybrid", for hybrids registered before 1975, and natural hybrids. It had been noted that many of the older hybrids were no longer being seen at shows, or at least not in the numbers they had appeared in the past. Such hybrids as *Dendrobium* X *delicatum*, *D.* X *gracillimum*, *D.* Bardo Rose, *D.* Andrew Persson, etc., were being seen less often at shows, and the show committee, reasoning that perhaps growers felt these older hybrids were no longer competitive, decided to create a class specifically to attract these plants. The ploy certainly worked and the bench was loaded. There were close to 70 plants exhibited, making it one of the best patronised sections of the show.

In the sections for species orchids there were some outstanding plants. Champion Native Species was awarded to Neil Finch for his *D. kingianum* 'Speckles' HCC-AD/ANOS, a lovely shell pink with darker pink stripes or "speckles" all over the face of the flower, producing a most unusual and striking effect. An ANOS Award of Distinction for colour was granted to this plant, as well as an HCC/ANOS for overall quality.

The year 1991 produced one of the best years ever for flowering of *D. speciosum*, and this was evident from the many quality plants displayed in the show. David Butler's *D. speciosum* 'Charlie', with its large, well-spaced, yellow flowers was judged best in this section. Other notable clones were 'Glennins', a very large cream flower with very heavy texture, 'Two Up', a lovely white with an excellent habit of inflorescence, and the renowned 'National White' HCC/OSNSW. David Banks produced some of his deep yellow *D. speciosum* var. *grandiflorum*, which really were a glorious sight in full bloom, and there were also a number of very good *D. speciosum* var. *hillii*,







Top: *Dendrobium kingianum* 'Speckles' HCC-AD/ANOS; Champion Native Species, ANOS Sydney Group Inc. Spring Show. Owned and grown by Neil Finch. Photo. David Titmuss.
Middle: *Dendrobium speciosum* 'Glennins'. Owned and grown by Michael Harrison. Photo. Michael Harrison.
Bottom: *Sarcochilus falcatus*; Best Orange Blossom Orchid, ANOS Sydney Group Inc. Spring Show. Owned and grown by Gerry Walsh. Photo. David Titmuss.

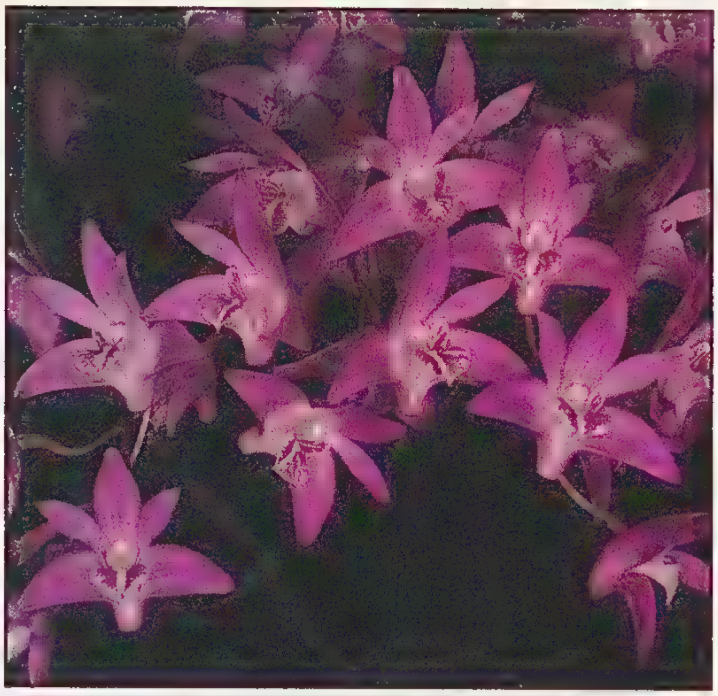
including an enormous specimen from Darryl Smedley.

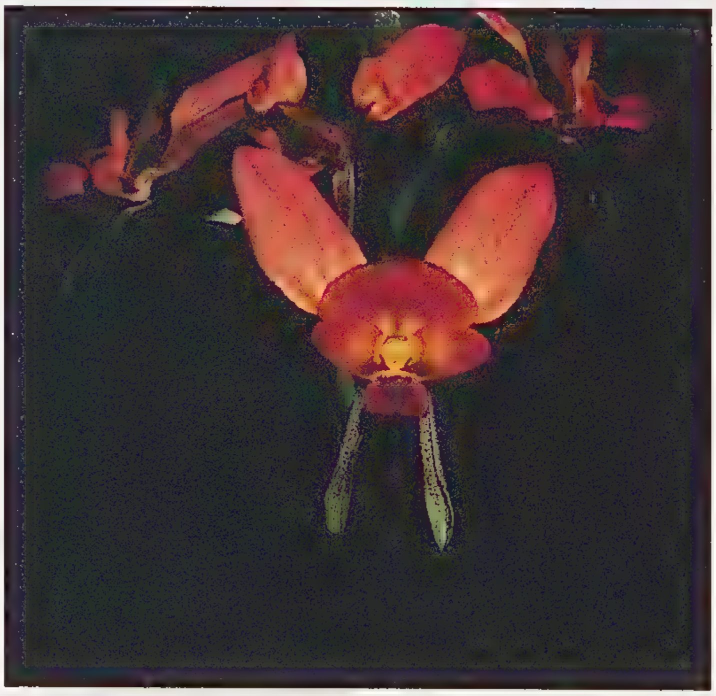
In the Other *Dendrobium* Section *Dendrocoryne* Section, Darryl Smedley scored with his *D. gracilicaule* 'Barrington', a richly coloured clone, heavily suffused with red-brown on the back of the flower. Neil Finch's *D. tetragonum* 'Wow' was a close second. The terete-leafed dendrobiums were also impressive with numerous plants of *D. striolatum, D. teretifolium, D. linguiforme, D. pugioniforme* and *D. rigidum.*

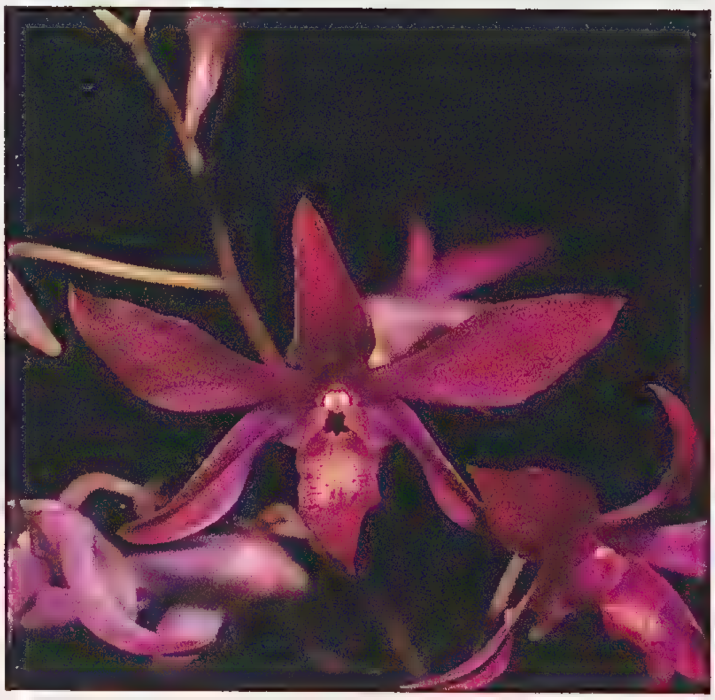
Roger Phillips and Rod Hawkes benched some well grown and well flowered tropical *Dendrobium* species, including *D. canaliculatum, D. discolor* and *D. trilamellatum.*

The sections for *Sarcanthinae* species were well patronised. Gerry Walsh won the sash and special prize for Best Orange Blossom Orchid, sponsored by Baulkham Hills Shire Council in conjunction with the Annual Orange Blossom Festival. His plant of *S. falcatus* was a large, multi-headed specimen carrying masses of beautiful white flowers. Other species on show included *S. hartmannii, S. olivaceus, S. weinthalii, S. australis, Parasarcochilus spathulatus* and *Rhinerrhiza divitiflora,* as well as the tropical *Robiquetia wassellii, S. moorei, Psarco. hirticalcar,* and *Phalaenopsis amabilis.*

The only real disappointment was the poor showing made in the terrestrial orchid sections, probably due to the less than favourable weather conditions. The most impressive terrestrials were the *Phaius* species, with seven or eight plants on display, the best being Mark and Allison Webb's *Ph. tankervillieae.* In the deciduous terrestrials, the best were *Caladenia dilatata* by Jim Lykos, *Pterostylis setifera* by Ron Howlett and *Pt. curta* by Stan and Barb Eustace.







Top: *Dendrobium kingianum* 'Ruperta'; Grand Champion of Show, Champion Species, ANOS Warringah Group Inc. Spring Show. Owned and grown by Eric Webeck. Photo. G. Wells.
Middle: *Diuris corymbosa*; Champion Native Species, Wollongong & District Native Orchid Society Inc. Spring Show. Owned and grown by Alby and Thelma King. Photo. Walter Upton.
Bottom: *Dendrobium* Mini Pearl; Champion Australian Native Hybrid, Wollongong & District Native Orchid Society Inc. Spring Show. Owned and grown by Russell Lea. Photo. Walter Upton.

ANOS WARRINGAH GROUP INC. SPRING SHOW

by Jim Bailey

The 17th Annual Spring Show of the ANOS Warringah Group Inc. was held on 21 - 22 September at the Mona Vale Memorial Hall. Although not as large as has been staged in some previous years, the show was still an overall success where the latest hybrids were exhibited.

Many of our spring shows are dominated by plants of *Dendrobium speciosum*. However, this year *D. speciosum* flowered early, and the large specimen plants of this species were missing from the section for Best *Dendrobium speciosum*. Nevertheless, Phil and Yvonne Spence exhibited a very good plant of *D. speciosum* var. *hillii* to win the section with Bill Westwood second with another plant of *D. speciosum* var. *hillii*.

Most members of ANOS Warringah Group Inc. reside in the northern suburbs of Sydney. The winter temperatures experienced here are never as severe as the temperatures experienced in the southern and western suburbs of Sydney. This winter, apart from a few cold days, was reasonably mild. Maybe this explains the early flowering of a lot of orchids, and why entries in some sections were less than in previous years. Entries in Best *Athecebium* Subgenus *Dendrocoryne* Section may have been slightly less, but the dominance of *D. kingianum* was still the same. Eric Webeck benched a large plant of *D. kingianum* 'Ruperta'. This plant was smothered with large dark red flowers, and was judged Champion Species Orchid of the Show, and Grand Champion Orchid of the Show.

Eric Webeck is well known for his ability to grow large specimen plants, and his super specimen plant of *D.* Bardo Rose was judged Champion Hybrid Specimen Orchid of the show.

The Champion Hybrid Orchid of the show was a plant of *D.* Golden Dorn owned by Phil and Yvonne Spence. This plant had four racemes, each carrying 7 to 8 large apricot coloured flowers.

Mick Korzenowski won the Best Australasian Miniature Orchid where his plant of *D. roseipes* edged out Phil Spence's plant of *D. smillieae*. Phil made amends in Section 30 where his plant of *D. alexandrae* won its section, and then went on to be judged Champion Australasian Orchid of the Show.

The Best *Sarcanthinae* Hybrid went to Ken Organ with a plant of *Parachilus* Perky. Ken has been exhibiting several plants of this hybrid every month for the past 11 months. They are continually in flower.

I think Lou Montuoro and Michael McTiernan are in the process of setting a record that will take some beating. They have once again won the W. Murdoch Award when their plant of *D. teretifolium* var. *fairfaxii* won its section, and then was judged Champion Specimen Species Orchid of the Show. This is a very spectacular plant and has been judged Champion Species Orchid and won the W. Murdoch Award at ANOS Warringah Group's shows on 5 previous occasions. The plant is over 4 m long and 1 m wide, and is very floriferous. Lou mentioned that he has to keep pruning this plant to prevent it from touching the floor of his shadehouse. Lou estimates that, over the years, he has pruned 1 m to 1.5 m off this plant.

Reg Angus won Best *Pterostylis* with a plant of *Pt. woollsii* carrying 3 flowers and a couple of buds still to open. It is a most spectacular member of the *rufa* group, but is seldom benched.

Gary and Harleen Williams won both the species and hybrid sections in the novice class.

While the plants in the individual sections comprise most of the show, it is the large displays which attract the attention. Phil and Yvonne Spence's large display was judged the best. Their display was one of quality plants, each plant being individually featured. Several of Phil's latest hybrids and Papua New Guinea orchids comprised the display.

John Roberts and Ron Gallagher were second with a massed display of orchids and foliage plants. John and Ron have staged a display at our spring show for many years. Chris Arnott won the small display of orchids. I think Chris has won this section since its inception.

DRAWINGS BY J.J. RILEY

John Riley has kindly provided ANOS Council with a series of watercolour prints of his work. These prints are available from the ANOS Treasurer (see centre page advertisement). An example of the quality of this offer can be seen in the rendition of *Dendrobium striolatum* on the rear cover.

WOLLONGONG & DISTRICT NATIVE ORCHID SOCIETY INC. SPRING SHOW

by Russell Lea

A few weeks prior to the show, members were concerned that they would not have many plants for the show. So it was with some reservation that we started to set up the show. It soon became apparent that our reservations were unfounded.

Most sections were well patronised, the exceptions being the *Pterostylis* and *Sarcochilus falcatus* sections. The *Dendrobium kingianum* class was well represented, from whites through to deep reds. The whites of *D. falcorostrum* caught the eye, but it was their perfume, as well as that of the other species, that activated the nostrils of most of our visitors; many said they could smell the show well before they could see it. Once they could see the show, their senses were overcome with the kaleidoscope of colour, and the intrigue of the flowers both large and small. The brilliance of tiny *Bulbophyllum* and *Plectorrhiza*, the charm of the *Sarcochilus*, *Dendrobium* and terrestrials, the wonder at the size of the large plants of *D. speciosum*, *D.* Bardo Rose and *D.* X *delicatum*, created an air of excitement throughout the shopping centre.

Of special note was Anton van Bysterveld's plant of *D. smillieae* which was Champion Cultured Orchid. It had 13 bottle-brush type inflorescences of a vibrant cream with dark green tips to the segments. Champion Native Species was owned by Alby and Thelma King, a fine large flowered clone of *Diuris corymbosa*. Champion Native Hybrid was Russell Lea's *D.* Mini Pearl, which had two upright racemes with 13 rich purple flowers on each. Champion Australasian Species or Hybrid and the Grand Champion of the Show was Tom Gray's *D. lasianthera* x *D. canaliculatum* which displayed nine large purple flowers on a very strong and erect raceme.

Apart from the champions, there were some very fine examples of species and hybrids to see. This becomes more evident each year as more of our members acquire hot houses. Our *Dendrocoryne* hybrid section took up four tables, and put on a display of colour of which a rainbow would be proud.

The show that had such meagre beginnings turned out to be a spectacular success.

ANOS CENTRAL COAST GROUP SPRING SHOW

By Walter T. Upton

The 11th Annual Spring Show of ANOS Central Coast Group was held at the Gosford Scout Hall, and was of its usual high standard. The show opened on the 7th September at 10.00 am, and by 10.05 am the hall was crowded and stayed that way for the whole weekend. Such was the interest in the show!

It was a happy occasion, made so by the sheer joy of being in the presence of our native orchids. On entering the Scout Hall, one was immediately aware of the fragrance, and stood in awe at the multitude of blooms, a far greater impact than an exotic orchid show. Although some of the exotic orchid blooms may be larger, they do not have the numbers that creates the overall visual effect.

Of particular note this year were the plants of *Dendrobium speciosum*, all six varieties being represented. Three monster specimen plants, two yellow *D. speciosum* var. *grandiflorum*, and a white *D. speciosum* var. *hillii*, would have won a specimen crown anywhere in the world. I am sure that, if they could be seen overseas, they would be the highlight of any show. The plants belonged to Vern Frampton, Ken Smith and John Makinson. Alas, only one could win the Best Specimen, and that honour went to Ken Smith. The show's Grand Champion and Reserve Champion were plants of *D. speciosum* var. *speciosum*, and were both owned by John Andrews, superb plants with very good habit of raceme. I do not think John has come back down to earth yet.

All classes in the show were well represented: for example, Class 16 Other *Dendrobium* Hybrids with *D. kingianum* Shape, 37 entries; Class 20 First Flowering Hybrid Seedling, 33 entries; terrestrial classes, 16 entries.

All the classes were of a high standard, particularly the hybrid classes and the *Dendrobium* X *delicatum* class.

The Best Hybrid Plant was *D.* Peewee x *D.* Star of Gold, a Laurie Jarvis-hybrid owned by Ken Smith. It was a delightful flat flower, red-purple with an underlay of cream-yellow, and a well proportioned labellum.

The Best Species Plant and Best Species Seedling was a vibrant dark red *D. kingianum*, a sibling cross from Down Under Orchids and owned by Vern Frampton.

ANOS FAR NORTH COAST GROUP SPRING SHOW

by Vernon Janetzki

August 29 - 31 saw the Spring Show of the Far North Coast Group of ANOS held at the Lismore Shopping Centre. Predictions of a good show following a dry sunny winter proved to be correct. About 190 plants were tabled, approximately 100 more than last year. However, it was not only the quantity which made the show a success, but also the quality of plants exhibited. There were about 60 good quality species on show, the rest being hybrids, mainly *Dendrobium* hybrids. The quality of the hybrids displayed continues to improve from year to year.

While the hybridiser's aims of broader segments, rounder, bigger flowers, and more colours may not be everyone's cup of tea, the development towards these aims was certainly evident. On the whole, these were combined with the important factors of good flower count and erect spike habit, or well-presented, semi-pendulous spike habit. It would be a shame for native hybrids to go the way of a number of exotic hybrids which need to be staked and tied to support, at times, just one or two flowers!

The major results were:

Champion Australian Native Species: *Dendrobium speciosum* var. *grandiflorum*, owned by Denis Lynch.
Champion Australian Native Hybrid: *Dendrobium* Lynette Banks, owned by Norm Mitchell.
Champion Australasian Orchid: *Dendrobium* Meadie x *Dendrobium canaliculatum*, owned by Keith Skaines.
Best Specimen of Show: *Dendrobium* X *gracillimum*, owned by Bevan Burnham.
Best for Culture: *Dendrobium speciosum* var. *pedunculatum*, owned by Keith Skaines.
Reserve Champion of Show: *Dendrobium speciosum* var. *grandiflorum*, owned by Denis Lynch.
Grand Champion of Show: *Dendrobium* Lynette Banks, owned by Norm Mitchell.

Winners of the Summerland Orchids prizes were:

Most plants tabled: Keith Skaines with 36.
Most successful exhibitor: Keith Skaines.

Prize for a plant showing the most potential went to *Dendrobium* Star of Riverdene x *Dendrobium* Kim, a first flowering seedling owned by Don and Enid Amey. This plant has a good chance of winning more prizes as it matures.

ANOS PORT HACKING GROUP SPRING SHOW

by Bob Napier

ANOS Port Hacking Group's Spring Show was held on 8 September at North Engadine Scout Hall, Old Bush Road, Yarrawarra. There were many entries in eight classes with the majority in the *Dendrobium* Hybrid class. The show was well supported with entries from most members, and, with David Hick's help with signs on the highway and publicity material, it was a financial success.

The major results were:

Grand Champion and Best Hybrid: *Dendrobium* Kalang, owned by C. Brandon.
Best Species: *Dendrobium speciosum* var. *speciosum*, owned by C. Brandon.
Best Specimen Plant: *Dendrobium gracilicaule*, owned by N. Roper.

ANOS MACARTHUR & DISTRICT GROUP SPRING SHOW

by Chris Munson

The first show staged by ANOS Macarthur and District Group was held in September this year, before we were 18 months old. Because no one told us we could not do it, we combined forces with a major regional shopping centre, CASULA MALL, obtained prize sponsorship of about $1500, and held our four day show at the peak native flowering period in September.

Over 300 plants were exhibited in 34 different sections. Some sections were poorly supported, but most were well represented with the *Dendrobium kingianum* section and the *D.* X *delicatum* section having over 20 entries each.

At the centre of our display was an eye catching collection of *D. speciosum* in full bloom, which brought much attention from the shoppers. In front of this was a table top display by Ray Young and Bill Kennewell, which featured both terrestrials and epiphytes in an attractive moss covered setting. Around this was arranged all our other sections.

Our most pre-eminent entries were a truly magnificently flowered *Diuris alba*, owned by Bill Kennewell, and a *D.* Star of Riverdene owned by Chris Munson.

Champion Plants were:

Grand Champion of Show, Champion Species Orchid, and Champion Terrestrial: *Diuris alba*, owned by Bill Kennewell.

Reserve Champion of Show and Champion Hybrid Orchid: *Dendrobium* Star of Riverdene, owned by Chris Munson.

Champion Australasian Species/Hybrid: (*Dendrobium lasianthera* x *Dendrobium canaliculatum*), owned by Reg Bartlett.

Champion Seedling: *Dendrobium kingianum* 'Special', owned by Ron Wheeldon.

Champion Cultured Orchid: *Bulbophyllum johnsonii*, owned by Erik Lielkajis.

AUSTRALASIAN NATIVE ORCHID CHAMPIONS FOR 1991

by Walter T. Upton

12th Australian Orchid Conference, Perth; Champion Native Terrestrial: *Caladenia filamentosa* owned by W. Joynes; Champion Native Epiphyte: *Dendrobium jonesii* owned by K. Gorey.

ANOS Central Coast Group; Grand Champion: *Dendrobium speciosum* var. *speciosum* owned by John Andrews.

ANOS Far North Coast Group; Grand Champion: *Dendrobium* Lynette Banks owned by Norm Mitchell; Champion Native Species *Dendrobium speciosum* var. *grandiflorum* owned by Denis Lynch.

ANOS Gold Coast Group Winter Show; Champion Native: (*Dendrobium* Graham Hewitt x *D.* Sunglow) owned by J. Mewburn.

ANOS Macarthur and District Group; Grand Champion, Champion Species and Champion Terrestrial: *Diuris alba* owned by Bill Kennewell; Reserve Champion *Dendrobium* Star of Riverdene owned by Chris Munson.

ANOS Port Hacking Group; Grand Champion and Champion Hybrid: *Dendrobium* Kalang; Champion species: *Dendrobium speciosum* var. *speciosum*, both plants owned by Col Brandon.

ANOS Sydney Group; Champion Species: *Dendrobium kingianum* 'Speckles' HCC-AD/ANOS owned by Neil Finch; Champion Hybrid: *Dendrobium* Star of Riverdene owned by David Butler.

ANOS Warringah Group; Grand Champion: *Dendrobium kingianum* 'Ruperta' owned by Eric Webeck; Champion Hybrid: *Dendrobium* Golden Dorn owned by Phil and Yvonne Spence; Champion Australasian species: *Dendrobium alexandrae* owned by Phil and Yvonne Spence.

Caboolture Orchid Society; Champion Orchid of the Show: *Dendrobium speciosum* var. *capricornicum* 'Southern Cross' HCC/QOS-STQOC owned by George Hellen and Doug Moss.

Central Coast's Orchid Spectacular; Champion Native: *Dendrobium speciosum* var. *grandiflorum* owned by V. Frampton.

Native Orchid Society of Toowoomba Inc. and Toowoomba Orchid Society Inc. Combined Spring Show; Champion Native Orchid and Reserve Champion of Show: (*Sarcochilus* Melba x *Sarcochilus* Fitzhart) 'Marie' HCC/QOS owned by R. Kanowski.

Orchid Club of South Australia, Winter Show; Champion Native: *Dendrobium* Blushing Sun 'Piccaninny Dawn' owned by R. & P. Rankin. This plant also won at the Gawler Districts Orchid Club Show.

Shoalhaven Orchid Society; Champion Native: (*Dendrobium* Eureka x *D.* Carawah) owned by John Apperley.

South West Regional Show, Griffith; Champion Native: *Dendrobium* Lynette Banks owned by Geoff Milton.

The Berowra and District Orchid Society; Champion Native Orchid: *Dendrobium* Yondi 'Anembo' owned by Ted Gogerly.

The Orchid Society of New South Wales; Champion Native Species: *Oberonia palmicola* owned by E. and A. Marks; Champion Native Hybrid: *Dendrobium* Australia owned by D. and V. Taylor.

Wollongong & District Native Orchid Society; Champion Native Species: *Diuris corymbosa* owned by A. and T. King; Champion Native Hybrid: *Dendrobium* Mini Pearl owned by Russell Lea; Champion Australasian Species and Grand Champion of the Show: (*Dendrobium lasianthera* x *D. canaliculatum*) owned by Tom Gray.

THE SEARCH FOR THREE QUEENSLANDERS IN PAPUA NEW GUINEA

Andree Millar
2/21 Windeyer Street, Thirlmere, NSW 2572.

Although I had been aware that Papua New Guinea shared many orchids with Australia almost from the first couple of years when I began collecting the native species around me, my knowledge was confined to those that had already made their mark in the orchid world from their early discovery in Australia. I soon had some of these in my collection: *Dendrobium discolor* (then *D. undulatum* which I brought from Papua) *D. nindii* (which we called *D. ionoglossum* at that time), *D. smillieae* (then called *D. hollrungii*), *Phalaenopsis amabilis* (we called the PNG form *P. amabilis* var. *papuana*), and, as the years went by, a host of others.

The ones that eluded me, and that I so desperately wanted, were *D. canaliculatum*, *D. johannis* and *D. bigibbum*. They were not reported for Papua New Guinea. Other than to say that *D. canaliculatum* was definitely an Australian species, Schlechter, in his descriptions of the orchids of what was then German New Guinea, made no reference to them. Other literature that I managed to beg, borrow or steal, said that the three came as far north as the Torres Strait Islands. To us that was close enough to be tantalising.

Another of my unfulfilled ambitions to that date, was to get to the Fly River and follow in the footsteps, or perhaps in the wake of his concrete boat, of Maria Luigi d'Albertis, a very eccentric Italian explorer who sailed up this river in the late 1860's. He wrote a book that I had the good fortune to read, with the most wonderful title, *New Guinea, What I Did and What I Saw*. In it he described an orchid as "the most beautiful yellow *Dendrobium* I have ever seen". He also described lions and tigers, and although I knew that these were illusions, the orchid was more than possible. So,in early 1968, I accepted an offer to sail up the Fly River when the Department of Agriculture gave us a trawler from Daru on a programme searching for wild rice on the Fly River system. So began my search for these three elusive *Dendrobium* species. Two days after I had left Lae, I arrived in Daru, and went up to the 'guest house'. Since the others would see to provisioning the boat with food and scientific gear, I took a native policeman and headed into the scanty bush on the island to see if I could locate a colony of *D. johannis* that I had found on my first visit. The guest house was fairly primitive in those days, built mostly of bamboo, but the rooms did have locks on the doors. I asked the owner for a key because I had three hundred silver shillings in my haversack to pay for the orchids I hoped to find. He was most incensed at the thought of things being stolen from his guest house. But he gave me a key, and told me to hang it on the door outside when I left so the girl could get in to tidy the room. I did as I was told, and of course my belongings were safe, but how nostalgic I feel about those old days. I would not do it there or at the Travelodge or anywhere else in today's sophisticated climate.

Sadly, the colony of four plants of *D. johannis* I had seen on my first visit had since been wiped out by fire during preparations for local food gardens.

The next day we left Daru and sailed down the coast to the Fly River. Once past the mangroves and miles of impenetrable sago palm swamps, we came to swamp forest where we spent hours wading around looking at every grass-like plant we saw in our search for wild rice species. Unless you have been in swamps like these, you cannot imagine what it is like. In most places they glisten with red and yellow, indicative of oil that was never found there in commercial quantities. The mud varies in depth, and suddenly you may find that what was over your boot-tops is now over your knees. You are exhausted in a very short time, but you have to go on because you came to the swamps to look for wild rice. And one thing that you are sure of is that if you do not find it in this one, there are plenty more ahead of you. So you squelch on, and cope with the swarms of insects as best you can.

However, I did find one orchid there. It was *Corymborkis veratrifolia*, a tall, woody stemmed plant with a large cluster of very attractive flowers with greenish to white sepals and petals, and a very lovely white labellum. It was the only plant in flower, but I feel now that there were probably more in the area because the vegetative parts are not very attractive and look like weeds.

In Australia, the range of *Corymborkis veratrifolia* extends from the Burdekin River to the tip of Cape York, but it is also found in Indonesia and Malaysia. In later years, I found it in several places in lowland rainforest in Papua New Guinea, always near the creeks or wetlands. The plant made such an impression on me that in a later visit to Bogor, Indonesia, I spent several happy hours looking at literature and material from Taiwan to Java to New Guinea.

Three days up the river, we came to a tree leaning out over the water. On a branch were several plants of some glorious yellow-flowered *Dendrobium*. I was sure that these were the descendants of those described by d'Albertis. They were medium sized, sturdy plants with tough mid-green leaves and erect flower stems, each with eight to ten blooms on them. We stopped the boat and the men rowed over to the trees, being careful not to put even a hand in the water, for this was crocodile country. I collected all eight of the plants, and some *Bulbophyllum* species, because it was obvious that the tree would go at the next high water. At the time, I thought it was *D. musciferum*, but later we found that it was just a lovely colour form of *D. macrophyllum*. This brings forth many heart-searching questions: what else is in those endless miles of swamps and riverine forests; what new species, new colour forms and variations have yet to be found. As one of my Indonesian colleagues said later, "Not many people will be as mad as you to go into that country". Actually, it is not the discomfort or the physical trauma that stops work being done in those miserable miles of border country, but the expense of getting there, and the time involved in covering just a small portion of depthless, oily mud before you can get onto high enough ground to catch your breath.

All the way up the river I had done the usual herbarium collecting and making specimens of any plant in flower. But I was very frustrated about the few orchids we had seen, mainly a few straggling *D. discolor*. There were few villages on the river, but we had to stop at each one to check on health problems and any other worries (which were plenty as this was leprosy country), and to write up the reports required by the various departments. One day, one magic day in 1968, we pulled into the side of the river and prepared to go ashore to the village. There was a straggly tree growing on the very edge of the bank, and to this several primitive canoes were tied. We used the canoes as rather unstable stepping stones to get to dry land. I grabbed hold of a branch when I lost my balance, and the shriek I gave made the others rush back thinking I had been frightened by a crocodile. I had put my hand on a small orchid - *D. canaliculatum*.

I could not believe my eyes or my hands, but this was really proof of my dream. Here was one of the 'special-to-me' North Queensland orchids in the Western Province of Papua New Guinea. All I had to do was find the others, and with *D. canaliculatum* in my hands, it did not seem such a formidable task. But I had a lot to learn. I showed the plants of *D. canaliculatum* to the local people when I finally got ashore, but could not raise a spark of interest. We had language problems here. None of our crew spoke the local dialect. There were miles of savannas behind the village, and I felt that there would be orchids in those trees. However, we did not have time to go and look; it was a trip to find wild rice. We were behind schedule, and had to report into the lonely, newly established patrol post at Kiunga as we had their supplies on board. Kiunga is now the thriving town for the great Ok Tedi goldmine. I kept my treasured onion orchids in my sight all the way home, especially after one of the cabin men threw them overboard in the cardboard box I had safely placed them. He could not believe that I would make such a fuss about three such scruffy little plants with no flowers on them. Believe me, I stopped that boat quick time and we went after them in the outboard.

The years went by. I was on the same side of the Range as the Promised Land, but it was too far away and too expensive for weekend jaunts. Then the unbelievable happened. In 1975, there was a developing tourist project at a remote place in the Western District called Weam. I would fly again to Daru, and then on the same day, charter a small plane and fly into Weam, the only way to get there. It was near the Indonesian border, and from there I could travel by speedboat down the river to a dry place called Balimuk which was being established for its great attraction for overseas sportsmen, deer-shooting. In the wet season, all the livestock depart for higher ground and leave the swamp to the fantastic bird life. But in the dry season, the plains are full of deer, wallabies, and cassowaries. Better still, the trees were full of orchids, like the trees on the river. I had taken with me a couple of plants of the little onion orchid we had found a few weeks previously in Rigo, in the dry savannas of the Central Province. I thought to show these to every villager we met in the hope that he would say, we have 'plenti tu mus' (too many).

We arrived in Daru in dubious weather. I went straight to the little single-engine plane, and the pilot agreed to try flying to Weam. The sky grew blacker every minute, and the dense cloud kept closing in as we got airborne. We were less than 400 feet up over the sea, and we could not see where we were going or where we had come from. So we turned back. Just after we landed, an army helicopter came in, and the pilot said, "I'm glad that you blokes turned back. There is a father of a storm raging round Weam". I knew those storms, and I was a mite glad we had turned back too, but I was bitterly disappointed.

So there I was in the Western District where I was sure there were the answers I wanted, and I could not do anything about it. I went up to the Fisheries Office, and they came through like angels. The storm was moving away from Daru, and they would give me a speedboat. I could head across the bay for the Oriomo River where there had been an unsuccessful attempt to establish an agricultural training school. If we could get there before dark, we could doss down in one of the deserted sheds - with the rats. But if there was the faintest chance of an onion orchid, I could take on the rats. So I rushed down to the trade store and bought some food. The officer lent me his sleeping bag, and also a couple of men. There were, he said, orchids all over the place, but he did not collect them. He was a prawn man himself.

We did not waste any time. The big rivers in Papua New Guinea are no place for any craft after dark, and especially not a small speed boat. Often ten-foot tall grass, sago palms, trees and shrubs, break away from the swamp edges in great chunks, and float down to the sea. They are nasty things to hit. The huge fronds of sago palms, hollowed out sago logs, and all the debris of a great tropical river can severely maul a small propeller, if not upset the boat and toss you in. This did indeed happen on one memorable occasion, which I still do not like to think about. Crocodiles were seen much too often for one's peace of mind. We arrived at the station after dark, lit our lantern, boiled a billy for tea, and went to sleep on the floor.

The next morning, we were up before the birds, had breakfast, and started up the river. So many trees were laden with orchids, hanging far out over the water, we did not know where to start. We found yards of *Bulbophyllum* with a sweet honey smell, several *Dendrobium* species, among them *D. antennatum*, *D. nindii*, *D. bifalce*, and *D. discolor*, dozens of *Oberonia*, *Luisia*, *Eria*,and more *Bulbophyllum* and *Dendrobium*; but no *D. canaliculatum*, and no *D. johannis*.

We came to a small inlet off the river. It was high water time, and we sailed in between the trees of the riverine forest. It was like a fairyland, and memory does not play me false. There were trees laden with hoyas, ferns, lovely vines and orchids everywhere. The trees were less than two metres apart, but we could get among them, and the water was deep enough to take us. We were very careful to keep our hands out of the water, for this was superb crocodile country, and the local lads were superb raconteurs.

Then, high up a climbable tree was a *Dendrobium* in full flower, large creamy white blooms. I soon had in my hands on a rare form of *D. nindii*. There were dozens of the common form around with its beautiful purple labellum, but we did not find another white one.

I eventually identified twelve species that we shared with Australia. But I felt that there were more special ones out in that inhospitable country. The Oriomo was an orchid-rich river, and it had been a wonderful time, but I had not found any more *D. canaliculatum*, nor *D. johannis*. An old report of *D. bigibbum* haunted me day and night. According to a report, *D. bigibbum* had been collected from the other side of the border, and I was practically there right then. I did not know when I could get back to the Western District.

This trip, even with all the help that I had been given, had made an awful dent in my available funds. The man who was in charge of my budget was not an orchid collector, and was inclined to snarl when I asked for money. I could only return to Port Moresby and hope that another miracle would occur.

A year later, I was allocated a trawler to work down the coast and check all the rivers of the Western District from Daru to Morehead where we actually shared part of the border with Indonesia. The coast here is flat with miles of reef and sand running out to sea. You need a good captain to know where the channels are, because it is often only the faint outline of coconut trees on the horizon that indicates the location of a village, and tells you where you are. We had a good captain, and did not finish up on a mudbank.

One wonderful day we went up the Mai Kussa River as far as the village of Buji. We dropped anchor and went ashore to look for a plant that we knew had been collected in this area by a patrol officer. There were miles and miles of

Melaleuca swamp. We found a track that we followed inland, and, with our unwilling guides, eventually came to the beginning of the swamp.

I had been slogging for at least an hour before I found my first beautiful sturdy plant of *D. johannis*, but then the rest of the party began to call from the various depths of the swamp. We compared what we had. The colour variations were astonishing. We found they were in all shades of white, yellow and brown, and some even had purple and bronze on the petals. They were there by the dozens on almost every tree, with no other *Dendrobium* in sight.

We kept going, and had to go quite some distance before we found *D. canaliculatum* growing in the same trees. We were able to collect enough for comparison, as they were nearly all in flower. One was almost pure white with very little colour, another had half white and half yellow petals, with a deep purple labellum and side lobes. One gem had almost pink petals and sepals with a light purple labellum. On the whole, the plants were smaller than those I have seen in Australia, but much bigger than the ones we found at Rigo in Central Province, and with more flowers on the plants.

There has been very little collecting done in these areas and believe me, I know why. Few scientists were interested in these areas, and, because I escorted them from one end of the country to the other, I was the first to find the orchids after Schlechter. The average hobby collector was not up to navigating these swamps. These huge areas of swamps, with their dozens of mini-climates caused by the extremes of high and low water, the varying vegetation from mangroves to nipa palms, to eucalypts and riverine forest, miles of wild sugar-cane swamp to equal miles of oil-filmed sludge, can only make one cry with frustration at the variation in the species, the uncounted natural hybrids. I remember a small place on the Sepik River where I went one night with Marj Purnell when my outboard had broken down, and the villagers took us up a small barat to a swamp where there were dozens of *Dendrobium*, obviously lovely hybrids, and growing with them were *D. lasianthera, D. mirbelianum, D. lineale, D. conanthum*, and *D. antennatum*. It was a small paradise for lovers of *Dendrobium* section *Spatulata* with (we decided) twenty natural hybrids in rainbow colours.

I can forget the hazards of the swamps now, the rats, the leeches, the multi-legged ants with their vicious biting equipment, but I will never forget finding those Australian dendrobes, the onion orchid, the Cooktown orchid (which we found on the Mai Kussa and the Wassi Kussa), and the best of the *D. johannis*. I can be glad that those swamps will keep them safe. The evidence of oil is only a mirage for commercial exploitation, but the orchids are real - very real.

DATE CLAIMER: PROPOSED TRIP TO 14TH WORLD ORCHID CONFERENCE, GLASGOW 1993.

Following the successful trip to the 13th World Orchid Conference in Auckland, New Zealand in 1990, ANOS Council has decided to organise a trip to the next World Orchid Conference to be held in Glasgow, Scotland, in April 1993.

As was the case for the New Zealand trip, Jetset have again produced the best package. They have provided a number of options, and the arrangements for the trip are flexible. The proposed tour includes:

- Return economy class group airfares
- Accommodation in twin bedded rooms with private facilities, including taxes
- Accommodation in Glasgow will be at the Moat House Hotel, right next door to the Conference Exhibition Building.
- Return transfers between airports/stations and hotels by private coach
- Some meals
- 3 day sightseeing tour in Lake District
- Trafalgar's European Accent Tour
- First class rail Glasgow/London
- Porterage of 1 suitcase throughout
- Jetset Travel ticket wallet and baggage tags.

You may feel that part of the trip is too long for you, in which case you can leave the tour and come home after the conference, or on the return from Europe.

Not included in the tour costs are: most meals, departure taxes, visa fees, insurance, gratuities of any kind, excess baggage charges, personal items. Prices are based on a minimum of 20 people travelling as a group. Should the group fail to reach this number, an increase in price may be necessary. Fares and prices are based on tariffs and costs applicable on 1 February, 1991, and are subject to change without notice in line with airlines, hotels, motor coach operators' costs.

Tour costs per person range from $6,380 to $7,598, depending on tour options. Be early. Place your name down if you are interested in making the trip. You will be placed under no obligation if you decide to drop out at any time before the trip departs. If you decide to go, **you will not be required to pay any deposit until 1 July 1992**.

Persons interested in the trip should contact Barry Collins, Tour Organiser, 245 Avoca Street, Randwick, NSW 2031 ('Phone numbers: Randwick home - 02-398-6448; Berkeley home - 043-88-5761; Work - 02-698-0336.)

DATE CLAIMER: NMQOC ANNUAL WORKSHOP

The North Moreton Queensland Orchid Council Inc. has been conducting a one-day workshop annually in March for five years. The last two have been held at the Redcliffe Entertainment Centre in suburban Brisbane. The theatre seats 400 in air-conditioned comfort, and speakers' slides are projected on to a huge movie-sized screen. A truly magnificent experience! We are fortunate to have been able to book this venue again for the next workshop.

The 1992 Workshop will be held on Saturday 14th March, with the list of speakers including Barry Fraser, proprietor of Papa Aroha Orchids in Coromandel, New Zealand. He is well known as a leading grower and breeder of paphiopedilums, and is an experienced and entertaining speaker. Barry was suggested and recommended to us by Kevin Hipkins of Royale Orchids, to whom we are indebted for his assistance.

Other speakers will be Wal Upton from Double U Orchids in Sydney on "The Genus *Dendrobium* in Australia", Ian Lonne from Lonne's Orchids in Cairns who will speak on aspects of CITES, Noel Heyden, one of Australia's best growers of *Phalaenopsis* orchids and will speak on that subject, and Jos Kimlin from the Plant Protection Department of the University of Queensland, Gatton College, who will present slides of photographs taken through the microscope of parts of orchid plants and some of their pests and diseases. As she says, on the large screen, mealy bugs 3 m long should be quite a sight!

In addition to the presentations by the speakers, the day will also feature a mini-show with a good schedule and prizes. Plants or flasks will be available from the speakers, and many items of interest to orchid growers will be displayed or offered for sale. These items include a wide range of books from Orchidaceous, Reko pots, Viking bushhouses, locally made plant-hangers and gadgets, and gold-encased orchids and plant material from Unique Designs. There will also be a badge swapping table set up during the lunch break.

A registration fee to cover the cost of the function has been set at $7.00 per person, and seats may be pre-booked by sending payment with details to NMQOC Inc., 10 Eucalyptus Street, Boondall, Qld, 4034. Tickets will be available at the door, but remember only 400 patrons may be accommodated in the theatre. The fee includes both morning and afternoon teas. Lunch may be purchased at the Centre or from nearby shops, or bring a picnic lunch and enjoy the shady grounds of the Centre.

If any Society wishes to consider organising a bus tour to the Workshop, please contact us at the above address, and we may be able to assist with your plants. Hope to see you there!

WANDERINGS AROUND BRISBANE

Gerry Walsh
7 Leslie Court, Werrington, NSW 2760.

During the last week of September 1987, I was lucky enough to spend four days seeing native orchids in the mountains west of Brisbane. The area I explored was centred in the Brisbane Forest Park, a region reserved as Brisbane water supply catchment. Access to most of it is restricted. My host was Ralph Crane who knows the area probably better than anyone around Brisbane. Ralph has permits to collect living plants and herbarium specimens for the Brisbane and Canberra Botanic Gardens. He has made many interesting recordings, notable of which is the discovery of several new species of *Pterostylis*, and the southern extension to the range of *Plectorrhiza brevilabris*, as well as new locations for *Peristeranthus hillii* and *Sarcochilus weinthalii*. It was with much cockiness that we were able to drive unchallenged through all the restricted areas because Ralph has his own master key to the locks on the numerous steel gates that guard all the access roads to the park.

On the first day we drove to a most unlikely little dry gully that drained into a small reservoir. I felt somewhat apprehensive as we bashed our way through lantana, and up into the dry creek bed. The first few hundred metres revealed nothing in the way of native orchids but, as is often the case in this type of terrain, epiphytes suddenly appeared everywhere.

The most common species was *S. ceciliae*. I was staggered by both the quantity and quality of them. I was used to seeing the little tufty plants of NSW, and nothing could have prepared me for the shock of these Brisbane giants. Nearly all had leaves around 8 cm long with some up to 12 cm long. In most instances, the old flower spikes were about 12 cm long, the longest being 28 cm. The gully was perhaps 500 m in length, and there would have been between 400 to 500 plants growing on everything from shale to big boulders, and even tree trunks. I was surprised to see only single plants, but a 100 mm pot would be needed to accommodate most of them.

Higher up the gully we found numerous plants of *S. dilatatus*, mostly on twigs that had fallen from the trees above. Some had continued growing on rocks and low shrubs, but most were lying on the ground.

At the head of the gully on a large single Red Cedar, the only rainforest tree in the gully, grew six or seven clumps of *Oberonia complanata* and *Dendrobium bowmanii*, both growing in full sun. I was surprised at just how large several clumps of *O. complanata* were, and especially how hard they were growing, no moss or shade. We also saw superb specimens of *D. linguiforme* along with *D. teretifolium* var. *aureum*, *D. tetragonum*, *S. hillii*, *Plectorrhiza tridentata* and *Cymbidium suave*. Quite a successful day by any standards.

The second day began at 4.30 am with a long hike down what is known as "the gorge". Four of us in two 4WDs headed out. One of the vehicles was left at the exit point many kilometres down the gorge, and the four of us in the other truck drove back to the headwaters, once again behind locked gates. After an hour of slithering around waterfalls and log jams, we reached the gorge bottom and found ourselves amid palm groves of tropical proportions. On the descent we saw infrequent examples of *S. falcatus*, *S. ceciliae*, *S. hillii*, *Rhinerrhiza divitiflora* and *Plrhz. tridentata*. Most of the high buttressed trees at the bottom were festooned with giant staghorns and elkhorn ferns, and the obligatory giant specimens of *D. speciosum* and *D. teretifolium* var. *aureum*. As we penetrated deeper into the gorge, we found *D. schoeninum*, *D. gracilicaule*, *C. suave*, *Papillilabium beckleri* and *Bulbophyllum exiguum*. As well there were uncountable thousands of plants of *Calanthe triplicata*, many with fat seed pods.

Four hours of walking found us reaching a point where the gorge narrowed in with the massive walls closing to a gap of about 4 m. This made it necessary to half swim through long pools of very chilly water to make forward progress. From water level, the cliffs rose steeply for several hundred metres on both sides. *D. kingianum* was extensive, the long thin cane form of mostly 30 cm in length. Unfortunately the local form was perhaps the very worst example of *D. kingianum* I have ever seen, tiny washed out pink flowers with deeper pink labella. None opened up widely, and all hung their heads in shame. After a welcome lunch, we commenced our climb out the eastern side of the gorge to the second vehicle. The slopes at this exit point were composed of crumbling conglomerate-type rock outcrops between which were very steep and loose shale 'slippery dips'. Each step had to be chosen with care to avoid spilling backwards and sending a landslide crashing to the bottom. Each member of the party paid particular attention to the position of the others, especially if the other was higher up the slope.

Much more *D. kingianum* was seen during our 45 minute scamper towards the ridge top. We began to see some spectacular clumps of *D. monophyllum* higher up. All were in fine condition despite what appeared to be very hostile growing conditions. The *D. kingianum* had almost ceased to grow where the *D. monophyllum* appeared. The heat reflecting from the bluffs was remarkable, and I could only speculate what conditions must be like at the height of summer. This was only the second time I had seen *D. monophyllum* in the wild, but the first occasion near Kyogle, NSW, was negligible compared to the vast clumps I gazed on this day. Many were in spike but only a few had flowers open. A sight I will never forget! On the shadier sides of the same rock outcrops were some very extensive sheets of *Bulbophyllum minutissimum*, a comparatively uncommon species, or rather a comparatively unseen species. Most people just don't see it.

Day three was to be the day of days. In anticipation of my visit, Ralph had contacted a Forestry Office hoping to gain some knowledge of where logging was being planned. This was two months before my visit. He was advised to contact a farmer who intended logging some of his property 'sometime in the future'. As luck would have it, he was cutting for a short time only, and this was while I was in Brisbane! We were told we could help ourselves to whatever plants we wanted. So we rose from bed at 3.30 am and drove three hours to the vicinity of Killarney on the NSW/Qld border. We took a rough track high into some private property to a log dump where the screaming of a chain saw greeted us from across a large gully. We were warned to watch for falling trees, then set loose to our hearts content.

Good finds of smallish *S. falcatus* and *D. teretifolium* var. *aureum*, and some excellent specimens of *Psarco. spathulatus* were interspersed with more mundane species like *D. speciosum* var. *hillii*, *D. gracilicaule* and *Plrhz. tridentata*. After half an hour some more interesting specimens began appearing, including *Liparis coelogynoides* and *B. elisae*, both in very good condition.

We had been combing the heads of trees cut a few days earlier, pausing every ten minutes or so to listen to the thunder of a big tree crashing to earth only a hundred metres up the bank. The orchid flora changed dramatically in that distance. In Tulip Oaks that had only been down mere minutes, we found large quantities of the uncommon *D. schneiderae* and some very good pieces of *B. bracteatum*. We spent around six hours snaking about the twisted debris, and concentrated our efforts on *D. schneiderae* and other small *Bulbophyllum* and *Sarcochilus* species. We each had a bucket full of *D. schneiderae* by day's end. This does not sound a lot, but this species does not form much more than small clumps that would sit neatly on a match box. The biggest clump I found was about 10 cm x 14 cm, and, as is the habit of the species, green bulbs were restricted to the perimeter and only totalled about 18 on perhaps 70 leafless bulbs. These old bulbs often produce new growth if back cut and will grow into a substantial 'green clump' in a few years.

Late in the afternoon we saw around a hundred plants of *Psarco. spathulatus* in full flower. They were mostly growing in very young Hoop Pines about 2 - 3 m high. What a beautiful native orchid this is. It has large flowers in relation to plant size, and they are longer lasting than nearly all other *Sarcanthinae* blooms. In a paddock beside the creek grew hundreds of plants of *Caladenia carnea* and a sprinkling of *Diuris sulphurea*. The pink and yellow blooms contrasted vividly to the deep green grass.

The highlight of the day came right at the end - a singular plant of *S. weinthalii* in flower, the first and only one I have ever seen in the wild. We rechecked all the juvenile *S. falcatus* in the surrounding bush, but remained convinced none was *S. weinthalii*. It is highly probable that there were some around but separating them from the *S. falcatus* would take a lifetime.

My last day was just as interesting as the first three. We drove a short distance, again through locked gates, to an area set aside for scientific purposes. We soon found some good clumps of a species I had longed to find for many years, *Oberonia palmicola*, I had created an image in my mind of this species growing in very moist and shady rainforest. This is not the case however. Instead it grew to perfection on a papery bark species in quite high light levels.

I also observed it on the bases of large Brush Box trees growing with *D. aemulum*. There was also a few plants on very low rocks. I was surprised to find that *O. palmicola* dies back, and appears insect infested in the wild, just as it does under my cultivation. I had often thought that my plants were going to die periodically, but even though some do, my plants mostly recover. It is good to know that this happens in the natural state as well. This is the advantage of seeing plants in the wild. One really gains an understanding of the conditions they prefer to grow in.

In this creek we also found *D. bowmanii, D. schoeninum, B. schillerianum* (very large clumps) and another first for me - *Peristeranthus hillii.* I had not recorded this species in this region, and it became a second distinct location within Brisbane Forest Park. Another five or six more common species were seen here as well. All in all, a very interesting little valley. My bus left Brisbane at 7 pm that night, and as the city faded behind, I contemplated the events of the past four days. I had seen seven species in the wild that I had not before seen *in situ,* and four others in quantities I had only dreamt about. The only thing I did not see that I had hoped to was *Plectorrhiza brevilabris.* Now that gives me a good excuse to return again some day.

STUDIES ON THE BIOLOGY AND CONTROL OF THE ORCHID BEETLE *STETHOPACHUS FORMOSA* F.M. BAIL.

Neil Gough and Brian Montgomery
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INTRODUCTION

Stethopachus formosa, the orchid or dendrobium beetle, is a native of eastern Australia, occurring from as far south as Sydney, and north to at least Coen on Cape York Peninsula. Although recognised since Fitzgerald's classic work in the l890's as a "pest" of orchids, much still needs to be learnt about its biology. Very few scientific papers have been published on *S. formosa* or its New Guinea relative *S. papuana.* Because the orchid beetle is a sporadic but serious pest of orchids grown outdoors, and so little is know about it, the Australian Orchid Foundation (AOF) financially supported a project aimed at studying the biology of the beetle, recording its distribution and host range, and improving control measures. The study commenced in 1990 with the AOF funds being matched by money from the Horticultural Research and Development Corporation (HRDC) in 1991.

DISTRIBUTION

Locality data on labels of museum specimens show that *S. formosa* occurs from Sydney to Cairns, and west to Condamine and Eidsvold. However, there are few *S. formosa* in museum collections, and we are seeking observations from orchid growers at the extremities of the range, from southern NSW, and far north and west Queensland. This approach has already proved fruitful with records from Coen (H. Young, pers. comm.), Goondiwindi (I. Blanch, pers. comm.), Millmerran (R. Kanowski, pers. comm.), and Mitchell (R. Crane, pers. comm.). In addition to distribution data, we need accurate information on what species of orchids are attacked (most of the above observations were made on *Cymbidium canaliculatum*), and when the beetles are active. To assist in obtaining distribution data from orchid growers, we have included a questionnaire with this paper [Ed. - The questionnaire is enclosed in this issue of *The Orchadian.* If you have information on the orchid beetle, please take the time to remove the questionnaire, fill it in, and return it to the listed address.].

The beetles are present all year in Queensland, but limited records show that they were collected only from October through summer in NSW. To date, the beetles have been recorded on orchids only, and records of feeding on other plants (which we would need to test in the laboratory) would be most welcome.

BIOLOGY

Population Studies

For ease of study, we chose to use orange crucifix orchids (*Epidendrum* sp.) as a host plant. Our main study site is a large patch of *Epidendrum* in St Lucia, Brisbane, which is regularly watered. Orchid beetles and their larvae feed voraciously on the flowers and buds. Both adults and larvae feed on immature seed pods in the field, but very rarely on the leaves or shoots, although beetles will eat the latter when food is very scarce.

This dependence on flowers is shown by the general population trends on *Epidendrum.* The orchids flower most profusely from April through winter and spring, which is also the time when most larvae are present. Peak populations of *S. formosa* occur in September when, at any one time, it is possible to find up to 400 eggs, 100 larvae, and 50 adults on our study patch at St Lucia. By late September and early October, numbers of flowers declined markedly as floral initiation was greatly reduced (presumably by unsuitable physiological conditions), and as existing flowers were destroyed by the beetles and larvae. This reduction in flowering occurs in both regularly watered and dry patches of *Epidendrum*, but is particularly pronounced when the patches of orchids dry out (as they did in the severe drought of 1991). With the cessation of flowering, beetles leave *Epidendrum* patches.

Because orange *Epidendrum* sp. are common in the western suburbs of Brisbane, they are obviously a major source of beetles which disperse and attack more valuable orchids. Thus, flowers of many *Dendrobium speciosum* were attacked in August and September by beetles flying in from *Epidendrum.* When the *D. speciosum* produced new shoots, these were also heavily attacked.

Temperature and Development

The effect of temperature on development has been examined in the laboratory, as has the longevity and fecundity of the beetles. As in all insects, the time for development varies with temperature. At high temperatures of 25 °C to 30 °C, eggs hatch in 4 or 5 days, and the larval stage takes a week. At low temperatures of about 15 °C, larval development takes about three weeks, and the pupal period more than two months. Eggs hatch in about 2 weeks in the field in Brisbane in late August, the end of winter. It is clear, therefore, that the whole life cycle can be completed in cool weather. *S. formosa* is thus able to reproduce and develop even during winter, the peak flowering time of *Epidendrum* sp. in Brisbane. On the other hand, the life cycle in warm weather is very quick, indicating that under hot, humid conditions the beetles thrive (as is shown by their pest status in north Queensland). However, a high humidity is necessary, because at high temperatures (30 °C) under dry conditions in the laboratory, many of the pupae died.

Fecundity, Longevity and Dispersal

The beetles are very long lived, some surviving in excess of 6 months in the laboratory, in which time some females laid more than 500 eggs. Once inseminated, isolated females can lay viable eggs for months. In contrast to the larvae which feed voraciously, and die if not provided with ample food, the adults are capable of surviving periods with poorer quality food. The adults may linger in an area if food is plentiful, but are also good fliers and capable of dispersing widely. In a simple trial where beetles were marked with paint and released on one *Epidendrum* patch, we found that a few moved to another patch 250 m away through bushland in 1 to 2 days. These experiments also showed that flowers of *D. speciosum* attracted large numbers of released beetles.

Natural Enemies

Although a wasp parasite does occur in Brisbane, the major larval predators are ants. Ants visit the nectaries on the flowers and buds of orange *Epidendrum* sp., the introduced coastal brown ant (*Pheidole megacephala*) being very common. At St Lucia in February 1991, when ants were very active and flowers scarce, we chose a number of flower heads with eggs of *S. formosa*, and banded half with tanglefoot to keep them free from ants. Over the next two weeks, larvae developed on most of the heads that were free from ants, and heavily attacked the flowers. No larvae developed on those heads with ants.

Careful observations showed that newly hatched beetle larvae were removed by the ants. When we placed eggs of *S. formosa* on heads visited by *P. megacephala*, the ants removed them. However, when beetles lay, the eggs are firmly stuck down and ants can not remove them. This is obviously an important function of the adhesive (so apparent if one tries to lift an egg off a bud) produced by the female beetle. Further studies showed that native ants (at least 10 species of which visit *Epidendrum* sp. near St Lucia) did not remove eggs placed on the flowers, but that some species did remove first instar beetle larvae. The ants seem to remove only small larvae, and experiments show that once the larvae grow to a large size, they are usually safe.

The behaviour of the beetles appears to be adapted to living with ants. For example, eggs are laid in the narrow throats of flowers of *Epidend-*

rum sp., away from the ants which visit the nectaries. When a larva hatches, it often tunnels directly down the flower stem, and so is hidden from the ants. If it can survive for a few days before the ants encounter it, the larva may then be big enough to survive. Eggs are often laid on seed pods where the young larvae bore straight through the pod wall and develop inside. Some pods (e.g. *D. speciosum*) exude sap when damaged by the beetles, and this sap appears to be very attractive to ants. Ants are also greatly attracted to the sap exuding from scars caused when the beetles feed on the new shoots of *D. speciosum.*

Preliminary work has shown that ants will remove eggs of *S. formosa* when the eggs are placed on the shoots. The role of ants in protecting *D. speciosum* will be examined as there are marked contrasts in the way it is attacked in suburban Brisbane. Thus, *D. speciosum* at sites heavily attended by ants are primarily attacked by the adults who chew patches on the leaves. The beetles do not seem overly concerned by ants, and on these plants there is little evidence of larval damage. At sites where ants are rare, the presence of adults is soon followed by the typical attack of larvae which go down the pseudobulbs, first destroying the growing point, and then boring right down the pseudobulb. In some of these pseudobulbs, it is possible to find 10 larvae, and more than half the pseudobulbs on a large plant can be destroyed. The decaying growing points attract vinegar flies (*Drosophila* sp.) whose headless small maggots can be seen developing in the nutritious soup of breakdown products caused by the attack of larvae of *S. formosa.* Although such studies have limited practical application because ants encourage aphids, pemphigids, mealybugs and scale, all of which are pests, they are necessary to understand the biology of the beetle.

CONTROL

The most common method of control is still to disturb the adults and catch them as they fall into the open hand. The only problem here is that they may have already laid eggs, and the eggs and young larvae are very difficult to detect. The chemical currently registered to control *S. formosa* in Queensland is Supracide® (methidathion), which is effective, but has a high mammalian toxicity. It is also unavailable in small quantities for the home gardener. An important aim was to find a less toxic replacement. Careful trials in the glasshouse and the field have shown that Carbaryl® is slightly superior to Supracide®, and has a relatively low mammalian toxicity. It is cheap and widely available, and much better at controlling beetles and larvae than Diazinon®, dimethoate® or Pyrethrum®, all of which are used by hobby growers at present.

One good non-chemical possibility is the use of a bacterium (*Bacillus thuringiensis*) specific to insects. This has been used against caterpillars in the past, and a new strain is now available which kills chrysomelid larvae. We will test this towards the end of the project.

FUTURE WORK

During 1992, work on the project will concentrate on three areas:

1. Visit to north Queensland to determine the pest status of *S. formosa.* Although work has so far been confined to southern Queensland, a field trip, probably as far north as Cairns, will be carried out in late April and early May l992. We would like to talk to orchid growers and will address as many orchid societies as we can. Our aim is to determine how severe a pest *S. formosa* is in the north. We also want to look for natural enemies and gather host records.

2. Completion of population study in southeast Queensland rainforests. The present drought has made our work in the wild almost impossible, and we need a further year's data under more normal conditions.

3. Study of orchids other than *Epidendrum.* In the remaining time (funding ends mid-1992), we wish to study the attack of *S. formosa* on other orchids, and have begun a detailed examination of their effect on cultivated *D. speciosum.*

ACKNOWLEDGMENTS

We thank Dr. and Mrs. Grimmett for the use of their garden in the long term study, and many other St Lucia and Corinda residents for allowing occasional observations. In fact, we have never been denied access to anyone's garden, a fact which has made much of the study delightful. Insecticide trials were performed in the garden of Mrs Lavis. Orchid growers, John Maynard and John Roberts, continue to give much help and encouragement. Mr. G.McCraith and the AOF continue generous financial support which has been matched by HRDC.

THE KABI TRIBE

Merv Venz
Lot 42 May Street, Godwin Beach, Qld, 4511.

Recently, a new ANOS Group was formed in the area centred around the north side of Brisbane. After some deliberation and a few false starts, a name for the group was finally settled on as KABI Group. This name was considered suitable because it is the name of the aboriginal tribe which inhabited the area that the new group intends to cater for.

The Kabi tribal area extended from the Burrum River in the north, to the middle of Pumicestone Passage in the south, and from the coast to the Burnett River in the west. It included Fraser Island, but apparently not Bribie Island. The southern section was known as Toorbul, the same name as the tribe inhabiting the Pine River, Brisbane River and Logan River valleys. Kabi country thus took in the coast from the Pine River to Fraser Island, and included the present Maryborough, Yabber, Widgee, Gympie, Manumbah, Kilkivan and Barambah districts.

After the name was published, a great many people expressed a desire to know more about the tribe. After some research I uncovered the following details:

Kabi men were short of stature, average height being about 1.7 m. The women were taller, up to 1.9 m. Their weapons were few and simple, and were used mainly for hunting. Nulla-nullas, called KUTHAR, were commonly made from Iron Bark (Brigalow and Scented Myall were obtained through barter).

Their boomerangs were narrow, and spears, called KONI, were 2.1 m to 3 m long, and made from Iron Bark and hardened by fire, which they made by friction and dry grass.

Their shields, called KUNMARIN, were made from Currajong trees, and were about 50 cm long by 25 cm wide. Currajong wood is very tough and when dried can withstand the full force of a spear. Knives, known as DHAKKE, and axes called MUYIM were made from stone. Handles were fashioned from pieces of scrub vine and secured with grass-tree gum. Both men and women were expert in the use of YURU, the climbing vine.

They used many plants as sources of food, including native orchids such as the terrestrials *Spiranthes, Caladenia, Glossodia, Diuris, Prasophyllum, Thelymitra, Microtis, Eriochilus, Acianthus, Dipodium, Lyperanthus*, and *Geodorum*, and the epiphytes such as *Cymbidium madidum* and *C. canaliculatum* and *Dendrobium speciosum.*

They also chewed various orchids as medicines to cure such ailments as coughs and colds and dysentery.

Many of our modern place names in the area are derived from words used by the Kabi tribe. The derivations for some of them are as follows:

Beerburrum - BIR-BARRUM, a green parrot.
Woorim (on Bribie) - YAROON or YARUM, hunting ground. A similar word, YIRIA means mud crab.
Burpengary - BURPIN-CAR, place of green wattle.
Caboolture - KABUL-TUR, place of carpet snakes.
King John Creek - named for King Jonnie of their tribe.
Mudlow - MOODLU, stone, also black snake.
Ningi Ningi - Devil Spirit (Bunyip).
Wararba - Box tree.
Toorbul Point - CHURRABOOL.
Caloundra - KALOWEN-DHA, place of beech trees.
Noosa - Shady place.
Maroochy - black swan.
Buderim - Honeysuckle.
Mt Coot-tha - native honey.
Durundur - place of scrub.
Imbil - scrub vine.

Sources:

Tribal Territory and Weapons: Pumicestone Passage, Kathleen McArthur.
Stature: Caboolture Country, Caboolture Historical Society.
Plant Foods and Medicines: Coliver, F.S., *Archaeology Papers*, Nos. 2 and 3.
Place Names: Coliver, F.S., Aboriginal Place Names, *Archaeology Papers* No. 16.
Pioneer Days, Caboolture Historical Society.
Spear and Musket 1879-1979, Caboolture Historical Society.

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AUSTRALIAN NATIVE ORCHID HYBRID REGISTRATIONS

(New registrations from lists in *The Orchid Review*, September to December 1991. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review.*)

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Colonial Maid	*bigibbum* x *falcorostrum*	P. Spence
Elegant Starlight	Elegant Heart x Bright Spark	W. Upton
Ellewong	Ellen x Wonga	B. Fletcher
Hewitt Sun	Graham Hewitt x Sunglow	D. Cannon
Hohoemi	Berry x *kingianum*	Saeki Nurs. (T. Taki)
Pink Elee	Eleebana x *kingianum*	W. Upton
Parachilus		
Sweetie	*Sarco.* Mavis x *Psarco. hirticalcar*	W. Upton
Sarcochilus		
Colonial Rose	*hartmannii* x *serrulatus*	P. Spence

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John Moye
Coolgardie Road, Wardell, NSW 2477.

We have all seen it happen sometime in the past. Toss in a seemingly innocent remark and before long, we have an argument! In our ANOS membership, we have a common viewpoint. We all regard our native orchids highly. But, in these times, is that enough? Our membership also implies other things as contained in the objectives of the ANOS Constitution, and generally embodied in the Constitutions of most ANOS regional groups. And it is probably these objectives which set us apart from other orchid groups. Can we then have differing points of view on these objectives, or pursue some and disregard others? I am certain that if we look at ourselves closely enough, we will find that, in fact, we do little to enhance the standing of ANOS in the broader community or to preserve our native orchids in their natural habitat.

Let's take a look at a few of our "misdemeanours". Some time ago, I gave a talk on native orchids to a local native plant group. During question time, a remark was made about the availability of poorly presented native orchids at the local supermarket. How do we answer questions on this point? That plants are widely available is common knowledge. Do we suggest that people buy these plants and hopefully, with considerable loving care, finally get them to grow, or do we say, "Don't buy those plants, it only encourages the retailer to continue selling them".

What do we do, if perchance we see a plant of suspect origin for sale somewhere that we would like ourselves? In a recent group newsletter, I read of a member's trip up north. He wrote about visiting known orchid environments, and also of a visit to an orchid retailer, even though it is common knowledge that this particular retailer sells a lot of bush-collected plants! Was he going there to admonish him?

Again, recently, I called in at a local species show. The flowers were great and the plant saletable well-stocked, including sad to say, many native species that appeared to be bush-collected and without a NPWS label. Does it really matter where these plants were collected from? Are our Queensland orchids of lesser value than ours in NSW? Should we buy these on the chance that our NSW plants will not be collected and offered for sale somewhere? That there are far too many places from which we can buy bush collected plants is obvious: roadside stalls, Sunday markets, nurseries, chain-stores, and the bloke who has just returned from a field trip up north, and many of these plants don't have the mandatory NPWS label. Yet, some of us still buy from these sources! We could buy better plants, cultivated seedlings, plants produced by tissue culture or plant division, from reputable sources. Why encourage the collection of plants from the wild, by continuing to buy from suspect sources?

Occasionally I have taken plants from the bush, and will probably continue to do so. I would like to think I have saved many plants from dying on the forest floor, or from being eaten by wallabies, through their relocation. Although it is technically illegal to salvage plants from trees and branches fallen to the ground during storms, or following forestry operations, in my view it is "less illegal" than some other practices which take place. In fact, our Group's suggestion to relocate plants from threatened areas, has been applauded by the NPWS.

I wonder why many ANOS members risk life and limb crawling around Blue Knob? Surely it is not for the view as there are plenty of other places around with better views. Yet, I read about visits to Blue Knob often in newsletters. I wonder what would happen if those who make it to the top happen to come across a clone of *Sarcochilus hartmannii* in flower? Would it still be there next year for others to admire? That hazardous trip is so unnecessary. Seedling plants of this species can be acquired from a local grower for a couple of dollars. Keep your eyes on the newsletters and note how often an article appears on a "Trip to Blue Knob" or other celebrated orchid areas, just for photography?

Most ANOS groups have an annual show. Further, we nearly all encourage members to bring plants to monthly meetings for judging. I've often wondered whether this competitive spirit is what we should be developing. Does it not, in fact, lead to the quest for that "better" plant? Most would argue, and probably rightly so, that the best plants are those which have been line-bred. But we still see at times, some great plants at our shows growing on bits of tree limbs. At a recent show, I noted half a dozen *Dendrobium canaliculatum* exhibited, all growing on bits of what appeared to be *Melaleuca viridiflora*! Now that's a tropical lowland species of *Melaleuca*, and not one that grows in the swamps out of town. And, it just so happens that it is the preferred host tree for *Dendrobium canaliculatum*. It does not do our image much good either, if a member of the viewing public questions show officials about the origins of plants presented this way. In fact, it can be down right embarrassing if the questioner is at all discerning. Our Constitution does say something about "protecting our native orchids in their natural habitat" doesn't it? Is it because of the probably acrimony that would eventuate, that we close a blind eye to those plants shown which appear to be bush collected? Congratulations to the Victorian Group who are at least appearing to be biting the bullet.

I was told at a Group meeting recently that all this talk about conservation was driving members away. At other meetings this year, I listened to a NPWS officer talk about many of the problems involved in conserving and protecting our national heritage, and later, to another speaker highlighting the need for the preservation of a healthy gene pool of all plant and animal species in the wild. For this to occur, the NPWS suggest colonies of at least 1000 plants of a particular species. On this basis, some plants are already at dangerously low levels, particularly "Blue Knob" *S. hartmannii* and *S. weinthalii*. Yet many of our attitudes don't seem to have changed much.

I recently inquired of the Minister for Natural Resources, in a private letter, whether such groups as ours would be able to salvage and relocate plants considered in danger through forestry logging operations. He replied, "each case would be considered on its merits". Not, "yes, we would encourage interested groups to do so, since all epiphytic and lithophytic orchids, and some terrestrials, are protected species". Perhaps we should all be becoming a little more politically active, or does it really matter if plants such as the two *Sarcochilus* mentioned above are remembered in name only or as plants in private collections? Does it really matter if our rainforests are logged, our eucalypt forests replaced by pines, or that wild forests are replaced by groves of planted trees? I've never seen a Tasmanian tiger, does it matter if my grandchildren never see a wild koala?

If we are true to the ANOS Constitution, then the answer to the last couple of questions should be, "Yes". But how do we go about developing a conservation ethic? Even among our own membership, it is sometimes hard enough. To do so among the broader community is an immense challenge. Mention "conservation" to some, and immediately you get retorts such as long-haired hippies, dole bludgers and dope smokers. Are we afraid of having these connotations transferred to us if we show some environmental concern? Or do we believe, as apparently many developers and politicians do, that all natural resources are there to be utilised, even if it means the extinction of some species? As a nation, have we still got the mentality that "if it moves, shoot it, if it grows, cut it down"?

We live in a highly competitive world where success is often measured in dollar signs, or trophies on the shelf, where power comes from manipulating the electorate or having influential friends, where poverty is often equated with not having enough get up and go, and where the great motivators are GNP and supply and demand. We have a lot to be thankful for and things to cherish. Our children and theirs should be able to sit under and gum tree and see koalas and orchids up above.

What do we do to develop this conservation ethic? Awareness of the issues involved comes through education and the following are some suggestions.

- Start at home by making our displays and shows less competitive. All of our plants have an intrinsic beauty, why try to make one "more beautiful" than another? Show off our plants because of this beauty so that others may appreciate it too.
- Restrict our plant commentaries at meetings to those who know most about the plants, the growers. Let them tell other members why they think their plant is good and how they go about giving it that tender loving care which undoubtedly it receives. I'm sure novice growers would benefit from this approach. Why do we persist in creating a dichotomy within our groups - the good growers with champion plants and others?
- Use our shows more as exhibitions. Develop a conservation theme, educate the broader community. Let them know that we have some highly developed and unique plants growing in the bush on the edge of town and they and their environment are worth preserving.
- Lobby our parliamentarians. Wild strains can only continue to exist in wild environments. These need preserving at all times, for all time, not for the life of one parliament, or until the need of another resource arises.
- Advertise the fact that we care about what is happening out there, and that for some fauna and flora time is running out.
- Forget about climbing the "Blue Knob". Buy your plants from the guy who raises seedlings or practices tissue culture. We are happy to do this with roses and grevilleas, why not orchids?
- Actively support the tuber and seed banks and distribute tubers and seed to others.
- Develop a working relationship with the NPWS and local councils. Survey the local area to find out what is really around and then do something about the preservation of any species considered endangered.
- Work towards having legislation enacted which protects both our fauna and flora, and their habitats.
- Keep evaluating what we have achieved and feel good about those positive achievements, no matter how small, and let others know.
- Keep referring to our Constitutional objectives and, above all, work together with a spirit of unity of purpose, to implement as best we can these objectives.

GREAT OCEAN ROAD APPEAL

Everett Foster
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I wish to bring to the attention of your readers an appeal to purchase privately held coastal heathland between Anglesea and Aireys Inlet which is under threat because of proposed subdivision. Threatened areas include land on the interim list of the National Estate.

A Great Ocean Road Appeal Committee has been formed, and an appeal launched to raise $500,000 to purchase land as it becomes available, and each acquisition will become an extension of the Angahook-Lorne State Park.

The Appeal is authorised by the Victorian Conservation Trust and supported by many groups, including Australian Conservation Foundation, National Trust of Australia, Victorian National Parks Association, Bird Observers Club of Australia, Field Naturalists Club of Australia, and Angair. The project is aimed at securing protection for the coastal heathland and associated natural areas which form the scenic introduction to the Great Ocean Road.

Angair (The Anglesea and Aireys Inlet Society for the Protection of Flora and Fauna) has already donated $30,000 to this appeal.

The area of land, which extends from Anglesea to Urquhart's Bluff, is orchid-rich, with 37 species being recorded. Some of these are common and not endangered, but still need protection, while others such as *Caladenia concolor, C. filamentosa* var. *filamentosa,* and *Prasophyllum lindleyanum* need preserving. Of special interest is *Thelymitra sp. aff. pauciflora* R. Br. (Anglesea), listed in the Census of the vascular plants of Victoria, which only grows in the area under discussion.

Apart from orchids, these coastal heathlands support a spectacular variety of plants and animals, some of which like the Rufous Bristle Bird and Swamp Antechinus, are now rare and in need of protection.

This Appeal urgently needs your generous support, and all ANOS Groups and Members are invited to give their support to preserve some significant orchids.

Donations to the authorised appeal in excess of $2 are tax deductible, and should be forwarded to: Victorian Conservation Trust, 8th Floor, 49 Spring Street, Melbourne, Victoria 3000.

BOOK REVIEWS

NEW TAXA OF AUSTRALIAN ORCHIDACEAE

by D.L. Jones, 1991. Australian Orchid Research, Volume 2, Australian Orchid Foundation. Octavo, soft cover, 64 colour photographs, 111 black and white line drawings, 207 pp. Price: AUS $24.50.

The Australian Orchid Foundation initiated a new research journal in 1989 with Volume 1, Catalogue of Australian Orchidaceae by Mark Clements. The many virtues of that modern checklist have been discussed elsewhere (*American Orchid Society Bulletin* 59(6): 577-578. 1990). The Foundation continues its prodigious output with the publication of Volume 2, New Taxa of Australian Orchidaceae by D.L. Jones.

Perhaps the most remarkable aspect of this volume is the number of additions to the flora, a total of 108 new species and two natural hybrids are described in ten genera. One expects such a multitude of new species to come from the largely unexplored wet tropics of exotic Borneo and New Guinea, or the remote sectors of the Andes - not the "well-known" flora of Australia. That 108 new species have been recognised from Australia points to our limited knowledge of basic orchid taxonomy as well as the value of re-assessing "known" plants.

The volume comprises a single article by David L. Jones, known for his long list of publications elucidating the taxonomy of Australian orchids. New species are described by Jones with various co-authors. Genera affected by this publication are *Acianthus* (5 species), *Arthrochilus* (6 species), *Caladenia* (31 species), *Chiloglottis* (11 species), *Corybas* (5 species, 1 hybrid), *Dipodium* (4 species), *Diuris* (15 species, 1 hybrid), *Gastrodia* (5 species), *Genoplesium* (15 species), and *Prasophyllum* (11 species).

The first 84 pages present text, starting with Introduction and Methods sections. Each genus is given a brief, one or two paragraph introduction, primarily to introduce references to recent literature. Each new species includes: a Latin diagnosis; type specimen citation; an in-depth description in English; selected herbarium collections; distribution and habitat data; flowering period; taxonomic notes; conservation status; and etymology.

Following the text are 64 colour photographs on 16 pages. The photographs and their reproduction are uniformly excellent. The final section of the volume is black and white line drawings of all new species. The 103 full-page and eight half-page plates are detailed and of high quality.

The volume is printed on quality paper and bound in signatures in a sturdy binding. The glossy cover is stiff and designed to stand up to heavy use. The cover photograph shows a phantasmagoric grouping of *Corybas recurvus.*

One observation from Clements' Catalogue in Volume 1 was the consistent application of a finely defined species concept. This is equally true of the new taxa described by Jones in this volume, based on the working method wherein "all taxa are recognised at species rank". Comparison of the colour photographs and line drawings of

Caladenia demissa with *C. leptoclavia* and *C. corynepetala* with *C. phaeoclavia* show the sharpness of the distinctions being made.

This volume should be part of every reference library concerned with Australian orchids. The new species described by Jones are all in addition to those of Clements' Catalogue. Together these two volumes define our current knowledge of Australian orchids. The present volume will be of limited use to horticulturists as most of the species are infrequently cultivated, especially outside of Australia and New Zealand. However, growers will be interested in a projected future volume on new species of *Pterostylis*, the greenhoods that are becoming more frequently cultivated in the United States.

Once again, "hats off" to the fine work of the Australian Orchid Foundation and the foresight of G. Hermon Slade and Gerald McCraith.

Eric A. Christenson.

***SOME ORCHIDS OF WEST NEW GUINEA* (pp. 183, 1973) by J. van Bodegom; *CONTRIBUTIONS TO THE KNOWLEDGE OF THE FLORA OF NEW CALEDONIA* (pp. 55, 1906), *REVISION OF THE ORCHIDS OF GERMAN SAMOA* (pp. 26, 1911), *CONTRIBUTIONS TO THE KNOWLEDGE OF THE ORCHID FLORA OF SUMATRA* (pp. 55, 1911), *THE ORCHIDS OF MICRONESIA* (pp. 66, 1914, 1921), *ATTEMPT AT A NATURAL NEW CLASSIFICATION OF THE AFRICAN ANGRAECOID ORCHIDS* (pp. 105, 1918), and *THE ORCHIDACEAE OF THE CELEBES* (pp. 96, 1911), with *THE ORCHIDACEAE OF THE ISLAND OF CELEBES* (pp. 97, 1925) by R. Schlechter; *NEW PAPUASIAN ORCHIDS* (pp. 61, 1934) by J.J. Smith. Quarto, softcover, perfect binding. Edited and translated by D.F. Blaxell, H.J. Katz, G. Nieuwenhoven, and J.T. Simmons under the auspices of the Australian Orchid Foundation.**

One of the pleasures allowed an author when writing book reviews is the opportunity to have fun with language, to infuse ordinary descriptive text with a modicum of literary adventure. Unfortunately, creative latitude disappears when critiquing works sponsored by the Australian Orchid Foundation - one is limited to adjectives such as basic, competent, fundamental, practical, useful, worthwhile and the like, the only sparks resulting from the flowery gradation to splendid, superb, and superlative. So with *a priori* praise given, I take this opportunity to publicise a spate of English translations from the Dutch and German recently released by the Foundation.

We begin with *Some Orchids of West New Guinea* by J. van Bodegom, translated from the Dutch by G. Nieuwenhoven and edited by J.T. Simmons. As resident commissioner at Manokwari in Dutch New Guinea (today's Irian Jaya, Indonesia) from 1953-1962, van Bodegom was a naturalist with a particular interest in orchids. He is perhaps best known to the orchid community for his discovery of *Paphiopedilum bodegomii*, now generally regarded as a synonym of *P. glanduliferum*. This work, compiled after the author's return to the Netherlands, is not a formal botanical account but rather a naturalist's notebook that includes descriptions, localities and habitat description, literature references, and discussion based on van Bodegom's observations. In all, 24 genera and 85 species and(or) varieties are treated in depth.

Translations of nine papers by Schlechter have been issued in seven volumes. Eight of these papers concern the Australasian flora, with one work on African orchids. The African paper, *Attempt at a Natural New Classification of the African Angraecoid Orchids* (1918), was edited and translated by H.J. Katz and J.T. Simmons. This paper was a fundamental generic restructuring of the *Aerangidae* and *Angraecinae* that is largely followed today. In it Schlechter described 12 new genera including *Bathiea, Bolusiella, Cephalangraecum, Chamaeangis, Crossangis, Eurychone, Oeoniella, Phormangis, Podangis, Rhipidoglossum, Sarcorhynchus*, and *Solenangis* as well as fully treating genera only briefly introduced in *Die Orchideen* (1914-1915). An indication of the impact of this paper can be gathered from the staggering total of 211 new combinations and names made. Beginning with a critical discussion of generic characters in the group, Schlechter provides a key to the genera. Each genus has a generic description followed by an enumeration of species with synonymy and very useful taxonomic notes.

The Schlechter papers dealing with Australasian orchids begin with *Contributions to the Knowledge of the Flora of New Caledonia*

(1906). This is the orchid treatment from a paper adding to Schlechter's doctoral dissertation on the flora of New Caledonia published in 1904. It is a straightforward enumeration with specimen citation, no keys are provided. Three new genera and 68 new species and(or) varieties are proposed. The Contributions were edited by D.F. Blaxell and translated by H.J. Katz and J.T. Simmons.

Schlechter's *Revision of the Orchids of German Samoa* (1911) was based largely on collections made by Vaupel. It updated and reworked Kraenzlin's largely unsatisfactory treatment (1898) based on the collections of Reinecke. It too is a straightforward enumeration with specimen citation and taxonomic notes, no keys are provided. Twenty-eight new names and species are proposed.

Contributions to Knowledge of the Orchid Flora of Sumatra (1911) was edited and translated by H.J. Katz and J.T. Simmons. This was Schlechter's principle paper on Sumatran orchids based on his collecting trip of 1907, later built upon by J.J. Smith in the latter's Enumeration (1933). Of the 150 orchids listed, 87 species and varieties were described as new to science.

The Orchids of Micronesia consists of two separate publications. A short paper originally published in 1914 describes the history of plant collecting in Micronesia, provides a tabular survey of the orchid genera in various island groups, and provides a key to the genera. The continuation of the paper in 1921 provides a full enumeration including notes on the genera, keys to the species, specimen citation, and occasional taxonomic notes on the species. Thirty-nine new species and varieties are described and three of these are illustrated: *Bulbophyllum ponapense, Nervilia palawensis*, and *Taeniophyllum palawense.*

Bound in one volume are *The Orchidaceae of the Celebes* (1911) with *The Orchidaceae of the Island of Celebes* (1925) translated by H.J. Katz and J.T. Simmons. The first treatment is based on Schlechter's collecting trip in 1909-1910. In it Schlechter described 150 new species and varieties. The later treatment is a full enumeration of the orchids known from the Celebes (Sulawesi) totally 321 species in 82 genera. Included are an introduction with a travelogue of Schlechter's field work in the Celebes, a tabular survey of the orchid flora, and a discussion of the floristic affinities.

The final publication to be considered here is *New Papuasian Orchids* (1934) by J.J. Smith, edited and translated by D.F. Blaxell, H.J. Katz and J.T. Simmons. This short paper by Smith is a companion to Smith's general studies of New Guinea orchids published in the journal *Nova Guinea* between 1909 and 1935. In it, Smith describes 36 species and varieties for the first time.

All of these publications are issued in softcover with perfect bindings (i.e., in paperback without signatures) with the exception of the New Caledonia work which is issued in a plastic spiral binding. The translated text is one simple font with original Latin descriptions "tipped in" to the text as facsimile. All of this has been done to keep the cost of these publications to a reasonable level (from AUS $9.50 to AUS $42.50).

These translations continue the superb work begun with the Foundation's publication of Schlechter's *Orchidaceae of German New Guinea* (see my review in the *American Orchid Society Bulletin* 57(4): 397-399. 1988). The process is on-going and the Foundation has announced the upcoming publication of J.J. Smith's *The Orchids of Dutch New Guinea*, a monumental work that will be issued in three volumes totalling 600 pages.

The publication of these basic taxonomic tools satisfies two needs, the need to have these long out-of-print texts made available again and the need to have them made more accessible by translating them into English. All of these texts should be purchased by research libraries and students of Asian and Australasian orchids. In addition, Schlechter's work on Angraecoid orchids should be considered by horticulturists interested in these African plants. Although much research has been published since Schlechter's generic restructuring, especially by workers at Kew, this article remains the basis for discussion of generic limits in the group.

The Australian Orchid Foundation remains - basic, competent, fundamental, practical, useful, worthwhile, grading to splendid, superb, and superlative. Their contribution to our understanding of orchids continues to impress.

Eric A. Christenson

[Ed. Dr Eric A. Christenson, 1646 Oak Street, Sarasota, Florida, USA, was commissioned by the Australian Orchid Foundation to write these reviews for the *American Orchid Society Bulletin.* I am grateful to Mr Gerald McCraith, Director, Australian Orchid Foundation, for giving his permission to publish them in *The Orchadian.*]

ASPECTS OF CULTURE OF AUSTRALIAN NATIVE EPIPHYTIC ORCHIDS

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[Ed. - This paper was presented at the First Australasian Native Orchid Conference, September 28-30, 1990, The University of Wollongong, Wollongong, NSW. It is published here with the permission of the author.]

INTRODUCTION

The successful cultivation of native orchids is dependant upon the correct application of a variety of cultural factors and considerations. There is no single secret method or technique. Rather, successful long-term cultivation relies upon the integration of all relevant cultural factors.

The novice grower soon learns the basic techniques through a combination of research of relevant literature, discussions with and visits to the collections of more experienced growers, and, most importantly, close observation of the plants under his or her care. As time goes by, techniques are refined, the collection is expanded, and expertise is developed. This process does not occur overnight, although with dedication and persistence a good level of success can be achieved reasonably quickly.

The cultural techniques used to grow orchids are based on the conditions under which these plants grow in the wild. The most valuable experience a grower can have is to see orchid plants in their natural habitat, to observe the environments under which they are growing, and to make assessments about how best to reproduce these conditions in cultivation. It is, of course, practically impossible to reproduce the entire range of orchid habitat conditions within the confines of an orchid nursery, however elaborate it may be, but once the grower has seen these plants in their natural environments, it is so much easier to make decisions about their cultural requirements.

For the grower of species orchids in particular, the joy of seeing these plants in the bush creates an indelible impression which endures down the years, and the ability to recreate a mental picture of the orchid growing in its natural habitat adds an extra dimension to the enjoyment of this most wonderful obsession.

EPIPHYTIC ORCHID HABITATS

The range of Australian epiphytic orchid habitats extends primarily down the eastern seaboard of the continent, from Cape York in the north to the bottom of Victoria, and then across Bass Strait into Tasmania, where there are just two species. Three or four hardy epiphytes also occur in northern Western Australia and the Northern Territory. The greatest concentration of epiphytes is in Queensland, where something in the order of one hundred and fifty five species are recognised, followed by New South Wales with approximately fifty species, and Victoria with five.

From the coastal lowlands to the high country of the Great Dividing Range, epiphytic orchids are found wherever conditions are suitable, although most occur at low to moderate altitudes on the eastern side of the ranges. Rainfall patterns along the east coast have resulted in the development of extensive hardwood (Eucalypt) forests, and in suitable locations on adequate soils, these are interspersed with areas of rainforest. Australian rainforests are diverse in type and are classified according to leaf size, tree layers and dominant tree species, but may be grouped broadly into tropical rainforests, monsoon rainforests, subtropical rainforests, warm temperate rainforests, and cool temperate rainforests.

Australian epiphytic orchids are essentially rainforest plants, although a considerable number have adapted to colonise drier forest types. These species, however, have maintained their affinities with the rainforest, and in most cases have not moved too far away. They mostly reach their best development in areas close to rainforest or in pockets of rainforest-like vegetation in sheltered locations in gullies or along watercourses. In such situations these orchids enjoy the moderate conditions they require for survival. There are, of course, a few species which have moved away altogether, and by various adaptations have been able to successfully colonise seasonally arid regions.

The many and varied habitats which orchids exploit each provide a different set of conditions, and within each macro-environment (i.e. altitude, temperature range and rainfall pattern) there are many micro-environments where variations in light intensity, air movement, aspect and humidity all come into play. The subtle differences between these various environments are difficult to analyse in a quantitative sense, but they determine whether or not a particular species will germinate and grow to maturity in a given location.

The nature of the host tree species, or, in the case of lithophytes, the chemical and physical make up of the rock, are also important factors. Some orchids are very particular about which tree species they colonise (e.g. *Dendrobium falcorostrum* on *Nothofagus moorei*, the Antarctic beech), whilst others will grow on a diverse number of host species. The ability of the bark of the host to hold moisture is probably an important characteristic but it is not absolute. Some potential host trees produce toxins which retard the growth of epiphytes, orchids included, and it is possible in the case of tree species which are good orchid hosts, that the bark has some nutritional value or other chemical that aids germination.

In their natural habitats, many orchids grow in hilly or mountainous locations, where there is always good air movement. As the air temperature rises during the day, cool, humid air is drawn out of the deep, shaded gullies and up the hillsides. It passes over and across the orchids, providing them with a continuous supply of fresh air and keeping them cool. Constant levels of humidity are also maintained as water vapour is carried along with the upward moving air. The orchids are protected from extremes of temperature and yet are able to position themselves in situations that provide the often high levels of light they require.

Some of the best orchid habitats are in areas where the general topography is broken and the canopy is partly open, allowing good light penetration and air entry. Along watercourses, especially around open rocky sites, and on ridge tops, are favoured situations for epiphytic orchids, and often an abundance of species is encountered in a relatively small area where conditions are ideal.

Likewise, when standing in a forest at ground level, it is difficult to appreciate the wealth of orchids that may be concealed in the upper branches and canopy of the trees. Some of the shade-loving species, such as the large 'Sarcanths' in tropical forests and, for example, *D. tetragonum* further south, may be visible from the ground but these represent only a small proportion of the orchid flora in many areas. The great majority of orchids is contained in the tree tops, and they grow there because that is where the light and air movement are best. It is only when one of these forest giants comes crashing to the ground that the great number of orchids is revealed.

Areas of so-called 'dry scrub' are also often very rich in epiphytic orchids. This type of forest is a stunted form of rainforest which generally occurs on poorer soils or in areas of somewhat marginal rainfall. It is characterised by a lower, more open canopy, which, again, allows good light penetration and air movement.

THE NATURE OF EPIPHYTIC ORCHID ROOTS

The roots of epiphytic orchids are unique, and their structure and function enable these plants to colonise situations, such as rock faces and tree limbs, which other plants are unable to exploit. Orchid roots are designed to perform two basic and equally important functions. They must first of all anchor the plant firmly to its host to provide mechanical stability. If the roots are not successful in this, then the second function of absorbing and conducting water and nutrients to the plant will be of no value.

A healthy orchid root is plump and white, and when in active growth the terminal 1-3 cm. portion is elongated and green. The white material is known as the velamen and it serves to protect the inner conductive tissues of the root from damage and dehydration. In general, the thickness of the velamen bears a close relation to the environmental conditions an orchid is able to tolerate. In moisture loving genera, such as *Bulbophyllum*, the velamen layer is only very thin, whereas in many *Dendrobium* species, for example, the velamen is much thicker, indicating an ability to cope with drier conditions.

Most epiphytic orchids are adapted to cope with periods of dry weather, interspersed with wet. The very nature of their epiphytic habit means they will be exposed to periodic drying, and this adaptation is an important one, for it gives them access to environmental niches where competition from many other plant types is at a minimum. The orchid is able to absorb water quickly when it becomes available, to store it in thick fleshy leaves and/or pseudobulbous stems, and to then continue normal metabolic activity over lengthy periods of dry weather.

In the natural state, the roots of epiphytic orchids spread out across the surface of the host, searching for water and nutrients. Although such water and nutrients are conducted into the roots through the green root tips, the shape and orientation of the roots form small runnels which direct free water to the root tips. During their most receptive period, at the beginning of a storm, the root tips readily absorb the first run-off water, rich in dissolved minerals.

Most epiphytic orchids are so well adapted to this wet/dry cycle that they need periodic drying to maintain good health. In some habitats, such as cloud forests, this wet/dry cycle occurs on a daily basis, with rain and mist enveloping the forest during the afternoon. Then, by next morning, the sun is shining brightly and everything dries out, just in time for another soaking later in the day. In other areas, many weeks may go by between falls of rain, and for orchids in such situations, the wet/dry cycle may be greatly extended. But, in just about all cases, the orchids' roots must dry out and be exposed to fresh, circulating air on a regular basis.

At certain times of the year, some epiphytic orchids may go into a state of semi-dormancy, in response to seasonally cool and/or dry conditions. At such times the root tips will become greatly reduced the white velamen may enclose the tip completely. This indicates the plant is in a resting phase, and watering and feeding should be reduced accordingly.

LIGHT

Light is, of course, an essential component when considering orchid culture. Many orchids require strong light to grow and flower well, and poor performance, especially poor flowering in cultivation, can be often attributed to less than optimum light levels. The general rule is that plants should be exposed to the strongest light they will tolerate short of causing damage, although it is best to drop back a little from the absolute maximum to avoid possible problems. Leaf yellowing is the main symptom of light levels that are consistently too high, and this can be easily corrected by applying extra shade or moving the plant to a shadier position. Scorching or burning of leaves may occur if a plant is suddenly moved from a shady to a sunny position, or on hot days if shading is inadequate. Small, pitted, necrotic areas on an otherwise normal leaf surface may also be caused by sun burn.

The amount of light an orchid is able to safely tolerate is directly linked to temperature. The hotter the air temperature becomes, the more the plant is at risk, and in anticipation of such extremes, many growers apply an extra layer of shade during summer. The relationship between light and temperature can be appreciated by considering the conditions under which certain high altitude species grow. In the highland cloud forests of north Queensland, a number of orchid species colonise situations where they are exposed to full sun. On the outermost branches of tall rainforest trees, or on open rock faces on the sides or tops of mountains, these orchids enjoy very bright light, protected by the relatively low air temperatures and high levels of humidity that characterise such environments. When these high altitude species are cultivated in warmer areas they cannot be given their preferred high levels of light because their thin leaves would quickly burn. They generally must be grown under somewhat heavier shade and the subsequent lack of light often results in poor growth and flowering.

Plants grown under the correct light levels look strong and healthy, with plump, hard pseudobulbs and strong leaves, usually mid-green in colour. Many species have pink or purple pigment in their pseudobulbs or on the undersides of their leaves, and this usually intensifies with good light. When insufficient light is available, pseudobulbs develop poorly; they are weak and lanky and do not mature properly. The leaves are a deep green in colour and have reduced substance.

Finally, flowering is the ultimate test of the adequacy of light levels. Good flowering is the result of good vegetative growth, and if the new growth has had the light it needs to develop and mature correctly, it should reward the grower by flowering to its full potential.

Nowadays, most growers use shadecloth to cover their orchid houses and provide shade. This material is easy to obtain, easy to install and long-lasting. Shadecloth (70%) seems to provide the correct levels of light for many of our most popular native orchids, particularly most *Dendrobium* species and hybrids. However, for many shade-loving orchids, 70% shadecloth does not afford enough protection, and grower must provide extra shade. The addition of a second layer of 50% shadecloth on top of the 70% creates an excellent light for many of these orchids, and most *Sarcanthinae* species and hybrids, as well as many other miscellaneous types, will perform to perfection under such reduced levels of light. Orchids grown on slabs also often require extra shade and are suited to these conditions.

It should be noted that these comments on light relate to orchids grown in central-eastern NSW, and growers in other regions may need to experiment with slightly different levels. Especially in areas further south, where temperatures are cooler and day length shorter, a base level of 50%

shade may be more suitable.

TEMPERATURE, HUMIDITY AND AIR MOVEMENT

The maintenance of a good "atmosphere" in the orchid house is central to the successful culture of Australian native orchids. Atmospheric conditions are the result of three separate but interrelated factors: temperature, humidity and air movement. The interaction between these factors relates to the condition of the air in the orchid house, and when the correct balance is achieved, the orchid house atmosphere is said to be "buoyant" or to "smell right".

These factors are, of course, in a state of constant flux, and the balances between them vary depending upon time of day, season and weather patterns. Temperatures rise and fall, as do levels of relative humidity, and air movement varies, but the aim of the grower is to create and maintain a fresh, airy atmosphere which is conducive to good orchid growth. A dry, arid atmosphere should naturally be avoided, as should a heavy, water-saturated one. Rather, the orchid house atmosphere should be fresh and uplifting, with gentle air movement and a clean, earthy, slightly moist smell.

Air temperature controls the rate of plant metabolism, that is (1) food production (the utilisation of light to produce sugars), (2) respiration (the expenditure of energy provided by food to continue the life processes), and (3) growth. All orchids have optimum temperature ranges within which they perform best. Some species have quite narrow ranges of tolerance and are easily upset by temperatures that are too hot or too cold, whilst others are able to withstand wide extremes.

Phalaenopsis amabilis, for example, a native of north Queensland's tropical lowland rainforests, prefers a temperature range of 15 - 30 °C, and although temperatures outside this range may be tolerated at times, they are stressful to this species. Low temperatures in particular are potentially damaging, and may result in the death of a plant. A sudden drop in temperature is especially dangerous, as plants in active growth are more at risk than those in a semi-dormant state.

In some places in the wild, *P. amabilis* is occasionally exposed to quite cool conditions, but by that time of year plants have become acclimatised by the onset of the dry season and gradually falling temperatures. In cultivation, *P. amabilis* is usually grown actively throughout the year without any kind of a dormancy period, as are a number of other tropical rainforest species. They take well to this type of culture and, as long as temperatures are kept up, and watering and feeding are continued, they perform well.

Conditions in the tropic forests which support *P. amabilis* are mild, and relatively high humidity levels are maintained by regular year-round rainfall (higher, of course, during the wet season; usually December-April) and the protective, closed canopy of the forest. Air movement is seldom strong but is constant. The differential between day and night temperatures rarely exceeds 10 °C and is generally somewhat less. This "soft" environment is remarkably constant throughout the year, and the differences between summer and winter, wet season and dry season, night and day are not great.

In certain areas, one has to travel not more than a few kilometres to come upon an entirely different set of environmental circumstances, and an orchid flora which is quite dissimilar to that which inhabits the shaded, humid protection of the tropical rainforest. Out in the open paperbark savanna of Cape York Peninsula, conditions are marked by extreme seasonality; during the wet season rainfall is abundant, temperatures are warm, humidity is constantly high, and orchids such as *D. canaliculatum, D. trilamellatum* and *D. bigibbum* make their vegetative growth. However, once the rains cease and these areas dry out, conditions become quite harsh. The very bright light, brisk dry air and almost complete absence of rain from about May - December force these orchids into a state of dormancy from which they will emerge only when the wet season commences again. As the dry season reaches its zenith, conditions are hot, dry and dusty, and regular fires are a feature of this habitat from October to December. Day temperatures may reach 40 °C or more, and during the early hours of the morning they may fall as low as 10 °C, a considerable day/night fluctuation.

Likewise, in temperate eastern Australia, different types of orchids prefer different habitats. Some confine themselves to warmer, humid and generally more protected situations, while others opt for more open areas, where temperature and humidity levels vary greatly. It all depends upon their biology and the conditions to which they have accustomed themselves.

Over the years growers have tended to group orchids according to their temperature requirements, and three broad categories are recognised:

1. ***Cool-growing orchids***: Many of Australia's favourite species and hybrids fall into this group, most notably the Section *Dendrocoryne* dendrobiums and the temperate *Sarcanthinae*. These orchids grow well under shade house conditions in most areas and are remarkably adaptable to cultivation. They are tolerant of winter-time minimums down to 0 °C as long as they are protected from frost, and summer-time maximums of 40 °C+ with adequate shading. They require cool conditions during the winter months to grow and flower properly, and usually fail to thrive in tropical climates.
2. ***Intermediate group***: Orchids in this group prefer somewhat warmer conditions and in many areas of temperate Australia they are best grown under cool (unheated) glasshouse conditions. Minimum temperatures during winter should not fall below about 8°C. Many orchids from topical areas grow successfully under these conditions, especially those which occur naturally at altitudes between 300 m and 1000 m. Species such as *D. rigidum, D. wassellii* and *D. tetragonum* var. *giganteum* are in this group along with *Peristeranthus hillii, Sarcochilus serrulatus, S. minutiflos* and *S. roseus*, among many others.
3. ***Warm-growing orchids***: These are the true tropicals, and included in this group are the Section *Spatulata* and Section *Phalaenanthe* dendrobiums, the tropical *Sarcanthinae* genera *Phalaenopsis, Vanda, Pomatacalpa, Robiquetia*, etc., and the tropical lowland species of *Bulbophyllum*. Winter minimums should not go below 15°C.

When considering the above temperature ranges, it should be noted that these conditions are not absolute and they should be used as a broad guide only. Many orchids which perform best under cool conditions will grow just as well in the intermediate house, and similarly, a number of species normally considered as intermediate types will be quite happy under cool conditions. As always, the grower should look to the natural habitat for guidance, and should always keep a close eye on the manner in which the plants are behaving.

With regard to maximum temperatures during the warmer months of the year, it is a practical impossibility to influence open shade house temperatures apart from providing extra shade. However, in an enclosed structure such as a glasshouse, the installation of an evaporative cooler may be of great advantage in moderating extremes. On hot sunny days, internal glasshouse temperatures may soar to 50 °C or more if ventilation and air flow through the house are less than adequate, and such conditions may cause severe injury or death to orchids. If the temperature in the glasshouse can be kept below 35 °C by a thermostically controlled evaporative cooler, the plants within will be much happier. The use of circulating fans to keep the air in the glasshouse continually moving is also strongly recommended as an aid to keeping temperatures constant throughout the house.

The temperature of the air determines the amount of water which can be held in the air as vapour, and the amount of water vapour actually held in the air compared to the amount of vapour which could be held in the air at a given temperature, expressed as a percentage, is known as the relative humidity.

Warm air is capable of holding more water vapour than cool air, and this generally means that levels of relative humidity rise as temperature falls, and vice versa.

Orchid plants lose water vapour through the stomates on the surfaces of their leaves, and the lower the relative humidity, the faster this vapour loss occurs. Consistently low levels of humidity over a period of time will cause orchid plants to dehydrate, and it is for this reason that reasonable levels of humidity are important to good orchid health. Most orchids prefer humidity levels of 50% - 70% and a hygrometer in the orchid house is a most useful aid to orchid culture.

The most obvious method of increasing humidity is to water the orchids, for as well as providing water directly to the plants, humidity is increased as water evaporates into the air. This, however, cannot be done all the time, and humidity levels should be maintained apart from the actual watering of plants. Very often the grower will feel the need to increase humidity without wetting the plants, and "damping down" may be carried out. This involves wetting the walk-ways and under bench areas and is an effective method of providing humidity. Many growers keep open containers of water in the orchid house to aid humidity, and fine misting systems are used in many orchid houses. In dry climates and in areas where artificial glasshouse heating is needed during winter, the atmosphere may become very dry, and the installation of some form of automatic humidification system may be necessary. Of course, in an open shade house humidity levels fluctuate with temperature and prevailing weather, and standard levels may be difficult to maintain. However, with the use of misting systems and by regular damping down on hot days, the grower should be able to keep humidity within acceptable limits.

Higher than preferred levels of humidity are sometimes a problem for certain types of orchids, especially during cool, damp weather. There are times when humidity levels stay naturally high for considerable periods of time, and this may result in stagnant, excessively damp conditions, especially in glasshouses. Good ventilation and a decrease in watering should overcome this problem, although flower spotting is always a nuisance during damp and overcast weather.

Continuous air movement or, more accurately, air exchange, is a feature of natural orchids habitats, and plants in cultivation must be provided with similar conditions. In a shade house, air movement through the house is generally adequate as long as the sides are not enclosed and closely adjacent areas do not become overgrown with garden shrubs and the like. Many growers do enclose the southern and western walls to provide protection from extremes of weather, and as long as this does not impede good air flow it may be beneficial in some locations and climates.

In a glasshouse it is especially important to ensure continuous air movement, and the installation of air circulating fans is a necessity. Good ventilation must also be provided by adequate venting, and the usual arrangement is to have below bench vents as well as gable venting. This allows cool air to enter at the bottom as warm air escapes at the top. Depending on the weather and season, these vents may be completely open to allow as much ventilation as possible, or may be closed up to conserve warmth and/or humidity. The internal fans should be kept running at all times.

Fresh, moving air is essential to the good health of epiphytic orchids and growers should not underestimate its importance in helping to provide the buoyant atmosphere so necessary to orchid culture.

WATERING

Watering is probably the aspect of orchid cultivation which causes the most confusion and is the most difficult cultural procedure to master. The provision of water in the correct amounts, at the correct times and in the correct manner is of prime importance and is the subject of judgement on the part of the grower. Frequency of watering is determined by a number of factors, and the grower must take into account the method of culture (pot or slab, size and type of pot, composition of potting medium), the prevailing weather conditions, including temperature, light levels, humidity levels and air movement, and the requirements of the type of orchid concerned.

In their natural environments, epiphytic orchids are, at times, deluged by soaking rain, often for days or even weeks at a time. Conversely, they are quite able to tolerate dry conditions, and many withstand periodic drought on a regular basis. The supply of water to orchids in the wild is not confined to rainfall as such; mists, fogs and dews all play their part in sustaining these plants, and account for their ability to colonise certain areas and situations. It should be remembered, however, that orchids have evolved in harmony with, and are adapted to the environments they inhabit, and their periods of vegetative growth, flower production and seed dispersal are timed to coincide with suitable climatic conditions.

In cultivation, water may be supplied either by drenching or misting, and a combination of both techniques is used by most growers. Drenching gives the plant a complete soaking, wetting all roots and the potting medium to the point where water is running off. The potting mix and root mass stay wet for a considerable period before drying out. Misting, on the other hand, wets just the exposed leaf and root surfaces, and results in a much shorter dry-out period.

Regular drenching is essential to the health of orchids in cultivation, for it flushes the potting medium, retarding the build-up of waste substances and other toxic materials. It also washes through the mix, helping to remove fine materials which tend to clog the mix and hinder air circulation to the roots. During the main growth periods, orchids require plenty of water, and drenching is necessary to ensure that supply. Drenching is the cultural equivalent of natural heavy rainfall, and when combined with an effective feeding programme, is an integral part of successful cultivation. There is, however, no substitute for natural rainfall to boost orchid growth. With this in mind, it is best to grow orchids under open shadehouse conditions where possible, even tropical types in temperate climates during the warmer months, so that they may be exposed to rain.

Misting or light watering (some growers talk about "splashing" their orchids and this is what they mean) provides water in lesser quantities and is often preferable to drenching much of the time. Most orchids in the bush are not subject to heavy rainfall on a regular basis throughout the year. Passing showers may result in just a few drops or, sometimes, only a wetting of exposed surfaces, but such water may be invaluable to these plants. Likewise, the moisture made available by mists and dews is important, and for many species is an essential part of their survival strategies. The purpose of misting is to simulate these conditions.

Misting is generally used by growers as an in-between measure, and a typical regimen would be to drench every second or third day and mist every other day. During the warmer months of the year, drenching may be required every day in order to keep water up to the plants. At these times, when days are long and evenings are warm, this is best done in mid to late afternoon, so that plants will stay damp overnight and have the benefit of this extra water around their roots. Misting can be carried out first thing in the morning, to augment the previous evening's soaking, and again mid-morning if necessary.

During really hot weather it is advisable not to water during the heat of the day, regardless of how tempting this may be, to avoid scorching or "steaming" of plants. The danger lies in wetting plants that are already hot, and unless the grower has the facility (i.e. overhead misting or sprinkling system) to continuously keep plants wet, it is best to keep them dry until they can be safely watered in the cool of the evening.

It is important to keep water up to plants during periods of warm, dry weather to maintain good condition and prevent dehydration. Dehydration will not necessarily damage plants but it will lower their condition and make them more susceptible to insect attack due to increased concentrations of sugars in their tissues. Growers need not try to keep their plants permanently wet during dry spells, a little drying out may be beneficial, but dehydration should be avoided.

At other times of the year, drenching may not be considered necessary more often than every 7 - 10 days, although daily misting may be beneficial. During the cooler months it is best to water only in the morning, so that excess water will have evaporated during the day and that plant surfaces will be dry by evening. This will greatly lower the risk of fungus attack.

Of course, orchids grown on slabs must be handled somewhat differently as the ability of a slab to hold water is much less than a pot. For orchids grown under this style of culture, it may be necessary to water several times a day, even during cooler weather, to maintain optimum growth. For many species which are amenable to slab culture only, the provision of adequate amounts of water may be difficult without some form of automatic misting system. Cloud forest species in particular are a problem, for they are used to swirling mists and dense fogs for a greater part of each day, conditions which are not easily reproduced in cultivation.

Generally, orchids make their main vegetative growth during the wet season, whether that be the typical wet season of the tropics or the wetter months of more temperate regions. Climatic conditions may vary from year to year, but on average the same weather patterns recur at approximately the same times from year to year, and plants in the wild are reliant upon this cyclical repetition.

During periods when regular, often heavy, rainfall is occurring, orchids make their main growth; new pseudobulbous growths and leaves are produced and the roots are also growing actively. At such times water should be applied liberally and frequently, and regular feeding of orchids should also be carried out. Some genera have definite growing periods whilst others grow more or less throughout the year.

Our temperate *Dendrobium* species mostly flower in spring (late August to early October) and then commence vegetative growth. New shoots appear from the bases of the mature growths and, as they elongate, new root tips begin to emerge. The developing pseudobulbs take a couple of months to reach full size, by which time summer is upon us. The fully grown stems and leaves harden quickly with the higher temperatures and extra light.

Another burst of active growth usually commences in late summer. Temperate eastern Australia enjoys its highest average rainfall from February to April and the orchids respond accordingly. Many dendrobiums produce another set of new pseudobulbs during this period and root growth is especially active at this time. As the weather cools towards winter, plant growth slows. The pseudobulbs are plump with stored water and the roots become much less active. From now until spring there is little activity except for the development of flowers.

Conversely, many temperate *Sarcanthinae* continue to grow actively throughout the winter and into spring. Their period of semi-dormancy is during the warmer months, from November to February, and during this time they should be kept cool and well shaded. These orchids are at their most active during autumn, when new leaf and root growth occurs rapidly, and repotting or remounting should be done in March or April.

One final point to be made about watering is that while an overhead watering system may be a useful and time-saving tool, hand-held watering is still the best method. Each plant can be given the individual attention it needs, and the grower can withhold water or add extra as considered necessary. The other advantage of hand-held watering is that the grower actually looks at each plant as it is watered, and these regular observations are invaluable in the early detection of cultural problems, insect infestation or fungus attack.

REPOTTING AND POTTING-ON

Epiphytic orchids live dangerously. They choose to colonise situations which in many cases are precarious, or at least insecure. They grow on tree trunks and limbs, and in doing so are exposed at times to very strong winds and driving rain, which quickly remove any dead or loose material. Arboreal animals and birds are climbing over and around them, breaking off and generally dislodging and loosening bits and pieces. Those epiphytes which grow on rocks also suffer from the same problems, as well as from falling stones and land slips.

Not only have these plants learned to live with such disruptive conditions, they have adapted to and thrive on them. Orchids are survivors, and they are quickly able to grow new roots and leaves when necessary, or to come away from secondary nodes, back bulbs and aerial growths. What they will not tolerate for too long are stale, static conditions.

Consider the rock ledges upon which grows *S. hartmannii* on the Queensland/NSW Border Ranges. There is constant removal of the spent organic matter upon which *S. hartmannii* feeds by frequent heavy storms, and this is constantly replaced by falling leaf litter and leaching of minerals from the rock and surrounding soil. The orchid's micro-environment is continually being disturbed by burrowing and scratching animals, and is regularly flushed clean by torrential downpours.

Growers have long appreciated the benefits of regular repotting in maintaining good orchid growth. Orchids grow strongly following repotting, for the process stimulates them to make fresh, new growth. The longer it has been since the last repotting, the more sluggish the plant becomes; too long and the plant's growth slows considerably and it starts to go backwards. Pseudobulbs become smaller, with fewer leaves, and root production is reduced. In short, the plant loses vigour.

Repotting then is a vitally important part of orchid culture and should be carried out regularly. For adult plants, every three years is a good rule, and although plants will survive for much longer than this they certainly will not grow to their full potential. Orchids should not be left until they show signs of regression before the grower decides to repot. Repotting should be done while the plant is in prime condition, and it will stay that way as long as a few simple rules are followed.

The grower must decide upon the best season for repotting, depending upon the type of orchid concerned. It is possible to repot at any time of the year but the best results are obtained if it is done at the commencement of the most active period of vegetative growth. This is not difficult to judge, and, although prevailing weather conditions will have an influence, spring, following flowering, and early autumn are generally best. It is important that the plant is just about to start or has only just started its period of new root growth, to ensure that as they develop, the new roots will grow unhindered and undisturbed into the fresh potting mix. If repotting is done too late, the new roots will be unmanageably long and may be damaged during the process. This in itself would not be tragic, and new root tips are occasionally lost to rough handling and insect attack, but it is best avoided where possible.

Repotting, by its very nature, causes substantial damage to a plant's root system. The healthy stems and leaves are left largely untouched, but the repotting process involves the removal of all, or nearly all, the spent potting medium. It is practically impossible to do this without also removing a considerable proportion of the roots. However, orchids are well equipped to deal with this and are quite able to replace a damaged root system relatively quickly. The advantages of repotting, carried out at the correct time, far outweigh the short term trauma.

The plant must first of all be removed from the old pot, and this is made considerably easier by soaking the plant for 5 minutes or so in a bucket.

Once the plant has been removed from the old pot, the grower should shake away any loose material. The root mass should be then cut away, especially from behind and below the older stems, leaving just the healthy white roots originating from the bases of the newer pseudobulbs. These should be trimmed back to no longer than about 80 mm. Any very old or dead pseudobulbs should also be cut away, and any cut surfaces should be dusted with a fungicide powder to seal the wound against the entry of pathogens. It is often not possible to remove all of the old potting mix and some pieces may remain attached to roots which are to be retained. This is not a problem as long as there is no apparent degeneration of those pieces and they are not harbouring insect pests. If, after proceeding to this stage, the plant is still very dusty or dirty, it may be advantageous to rinse or wash the orchid in order to remove fine fragments and other extraneous material such as moss. At this point it is important to note that all growers should ensure that their cutting instruments are sterilised from one plant to the next to avoid spreading disease. There are a number of methods available; my method is to wipe the cutting blades thoroughly with 70% alcohol swabs.

The orchid is then held firmly in position in the new pot, with the leading pseudobulb(s) far enough from the edge to allow for at least 2 years growth. The potting mix is then poured in by hand until it comes up to the base of the rhizome, which should be more or less level with the rim of the pot. In the case of monopodial orchids, the potting mix should come up the stem to a point just above the most recent root. The orchid can be repositioned slightly to ensure it is sitting firmly in the correct position. Plants which are at all unsteady, especially those which are tall, should be staked to prevent any movement in the pots. The grower should tap the sides of the pot firmly a number of times as the potting mix is being poured in to evenly distribute the mix, but it should not be packed hard or forced in with pressure. Remember, the potting medium must allow free air movement and must drain freely. Many growers use terracotta crocks in the bottom third of the pot to ensure good drainage. However, as fewer and fewer growers now use clay pots, it is just as good to simply use larger chunks of the potting medium in the bottom of the pot to achieve the same result.

The technique for potting-on is essentially the same as repotting, except that the plant is removed from its old pot and placed in to the new pot without any disturbance to the existing potting medium and root ball. Potting-on is generally the repotting method used for seedlings as they are advanced from 40 mm tubes into larger pots, and it is also often used for plants in pots up to 100 mm. Above that it is not recommended, as the dangers of excessive medium breakdown are too great. It is a simple process to slip a seedling out of its 40 mm tube, align it in its new pot, and then fill in the potting mix around the edges. It takes only about a minute and is an efficient way to repot seedlings.

It is important to note that nothing impedes the drainage and free air movement through a pot more than dusty potting mix. Any fine particles are very quickly washed through the medium to the bottom of the pot where they clog the air spaces and hold excess water. During the preparation of any potting mix for epiphytic orchids, the individual components should be sieved and/or washed to remove fine materials such as sand, small bark fragments and dust. The use of a 3 mm sieve is essential for this purpose. It is also usually necessary to sieve the mix periodically during the potting process to remove dust and fines created by handling.

The general rule when potting an orchid is to use a coarser grade mix for larger pots, in order to avoid the excessive retention of water which may result if too fine a grade is used. My preferences for general potting media for cool-growing epiphytes in plastic pots are as follows:

Seedling mix for 40 mm tubes; 4 parts pine bark, 1 part quartz pebbles, 1 part crushed river gravel, 1 part charcoal (all components approx. 6 mm diameter).

Squat pots up to 80 mm; 4 parts pine bark, 2 parts quartz pebbles, 1 part crushed river gravel (components 6 mm to 10 mm diameter).

Squat pots 80 mm - 200 mm; 4 parts pine bark, 2 parts quartz pebbles, 1 part crushed river gravel (components 10 mm to 14 mm diameter).

Pots above 200 mm; 4 parts pine bark, 2 parts quartz pebbles, 1 part crushed river gravel (components 10 mm to 14 mm diameter).

The strict adherence to the component diameters listed above is not essential and they are only guidelines. It is certainly not at all detrimental to mix coarser and finer grade components, as long as the end product is a potting medium that gives good results, and many growers vary the grades in their mixes with great success.

Apart from the components listed above, there are many others used by growers in various amounts and combinations, including fir bark, sequoia bark, casuarina bark, sphagnum moss, blue metal (crushed basalt), volcanic scoria rock, chopped bracken fern, chopped treefern, perlite, polystyrene, rice hulls, etc. The precise composition of a potting medium is not critical as long as it is not toxic to the plants and it has suitable physical and chemical properties. It should be durable, not too heavy or too light, capable of being wetted and retaining some water and have a pH of 5.5 - 7.0.

In recent years many growers have been treating their bark prior to including it in their potting mixes, and there is no doubt this results in substantial benefits. The purpose of such treatment is to remove toxic materials in the bark, to establish a suitable pH so that nutrients can be held in the potting mix and made available to the plants' roots (pH range of 5.5 - 7.0 is ideal), to make the bark moisture retentive rather than shedding water, and to overcome the "sterility" of fresh bark by saturating it with nutrients, especially nitrogen. This last-mentioned function is especially important, for fresh bark is virtually devoid of any plant nutrients.

The treatment process involves either soaking the bark in a rich solution of water and dissolved minerals, or composting the bark with urea and certain other ingredients. The composting method is suitable for bulk quantities of a cubic metre or more, but most hobbyist growers use the soaking method to treat smaller quantities. The following formula has been used in recent times with great success by a number of growers:

For the treatment of a quantity of approximately 0.15 cubic metres (i.e. three large 50 litre bags of bark) mix the following quantities of dry chemicals: urea, 2 metric cups; iron sulphate, 0.6 metric cup; potassium sulphate, 0.6 metric cup; microfine lime, 1 metric cup; and Aquasol®, 0.6 metric cup.

Place the bark in a large plastic bin or other container, add the chemicals, fill with water and mix thoroughly. Ensure the bark is completely immersed and leave it for 10 - 14 days. After this time remove the bark and rinse it thoroughly with fresh water to remove all traces of residual chemicals. Allow it to dry before using it or storing it for future use.

During the repotting process it is important not to misplace or mix-up the potting labels. This is easily done and can cause much confusion. Each plant should be repotted separately and the old label put to one side. Once the plant has been repotted, a new label should be written out immediately and put into the new pot. Information such as the plant's name and origin, as well as the date of repotting should be recorded, and if the grower gets into the habit of writing a fresh label as part of the repotting process, these details will not be lost.

Nowadays, the emphasis must surely be on the cultivation of nursery raised stock rather than wild collected plants. Orchids grown from seed are more readily available, are of higher horticultural quality and are easier to grow. Those clones that thrive in cultivation are generally the ones chosen by breeders for the purpose of propagation and this characteristic is usually passed onto their progeny.

Finally, the best recommendation I can give regarding the culture of native orchids is to observe the plants in your collection. They will tell you what they need. If they are not thriving then something is wrong. Are you watering too much or too little? Are temperatures too high or low? Is the orchid house atmosphere out of balance? Are you allowing too much light or not enough? The list of possibilities is substantial. Make an educated guess as to where the problem(s) lies and explore that avenue until it proves right or wrong. If you guessed wrongly then try again. Sooner or later things will fall into place and it will become obvious from the condition of your plants that your techniques are paying dividends.

HOW I BEGAN PAINTING NATIVE ORCHIDS

Helene Wild
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I guess I have been making pictures for as long as I can remember. As a very young child, drawing and painting were almost daily pleasures. I remember my brother and I sitting at one end of our large kitchen table happily engrossed with coloured pencils, crayons, pastels or watercolours, while our mother baked, ironed or prepared the evening meal. Every Christmas we received at least one colouring-in book which would keep us amused and out of Mum's hair for hours at a time.

At primary school arithmetic was the bane of my life, and after struggling all week with tables, fractions and long-division, the Friday afternoon art class was a long-awaited and most welcome relief. Nature Study was another subject which I really enjoyed, and my exercise books were lavishly illustrated with birds, flowers and insects.

While at secondary school, my life followed more or less the same pattern, with maths being my worst and least enjoyed subject, and art, needlework, typing and shorthand much more to my taste. At one stage I thought I might like to become an art teacher, but the Victorian Education Department did not want a teacher with allergic bronchitis and bunions, so I became a secretary at the Printing Section of the State Government Department. It was not long before my artistic "eye" was recognised, and, quite often, I was given sole responsibility for designing the layout of the article to be reproduced.

During this period I discovered boys, and after a succession of boyfriends, I met and married Alex. In due course a baby arrived, and I was trapped in suburbia with an endless string of nappies, playgroups, kindergarten, and eventually schools. I was sometimes frantically busy, but I enjoyed my life and would not have wished to change anything.

Then, one day in 1982, Alex came home and announced that he had joined the Australasian Native Orchid Society, Victorian Group, and would be going to his first meeting on Friday night. Not another night at home alone with a young child! Suddenly I realised that I wanted to do something for myself, and that it was also important that I share my husband's interests. So there was a quick telephone call to my parents, and Alex and I were both able to attend our first native orchid meeting. We were hooked! And it did not take us long to collect quite a number of our favourite epiphytes. I have to admit that we always drooled over the showier epiphytes on the display bench, while the smaller, daintier terrestrials were almost completely ignored.

Shortly after joining ANOS, we went on a holiday to Gippsland, and spent a day with friends who were living on a hobby farm near Buchan. While exploring a bushy part of their block, Alex discovered a number of leafy rosettes beside a path. He was convinced they were orchids and our hosts invited us to help ourselves. Not wishing to appear greedy, Alex carefully dug up three of them and we took them home and put them into pots. The following July they flowered for the first time, in-between meetings, of course. We had no idea what they were so I dusted off my long-neglected box of watercolours and carefully sketched this appealing little plant. I achieved a respectable likeness, and was reasonably pleased with the result. At the next ANOS meeting, I cornered a group of terrestrial "experts" who instantly recognised my sketch of *Pterostylis curta*.

It is amazing that what seems like an insignificant event in one's life can suddenly change one's whole direction. Our son was now at secondary school, and I found that I had more time to myself. So I began painting again. I chose the same sort of subject matter that I had enjoyed all those years ago at primary school: native birds, small native animals and flowers, especially native orchids. And then our son's school held an art show and I entered four paintings, and sold one - I was so excited! It is quite true that success breeds success. This was the stimulus that I needed and I enthusiastically produced dozens of little paintings as I attempted to rediscover the artistic promise I had displayed as a child.

By this time, Alex and I had become involved with activities within ANOS. We had become leaders of the New Members Group, and had joined the Show Committee. At one Show Committee meeting someone mentioned that a member of our Society had requested space to hang some native orchid paintings. Not to be outdone, Alex said, "Helene paints, may she hang some paintings too?" Permission was granted. So, for the next few weeks, housework was ignored while I created a string of "masterpieces". The show was a success. I learnt a great deal from that first showing, and realised that hours of hard work and dedication lay ahead if I was ever to reach the standard I now set myself. Gradually I came to realise that the terrestrial orchids had begun to claim my attention as I discovered their intriguing shapes and subtle colours. I wanted to know more about them; where did they grow, and when? So, whenever they were available, I obtained plant listings from National and State Parks and took more interest in field trip reports in our Society's monthly newsletters. Then I typed up lists of locations and flowering times. Now, when I receive a commission for native orchids from a specific location, I have a list of flowering plants at my fingertips.

Those first three *Pterostylis curta* grew and flowered, producing new tuberoids with great abandon. At one New Members Group glasshouse visit, we were all given pots of *Pterostylis nutans* which also multiplied readily. We were encouraged to request tuberoids of other species from the Victorian Group's Tuber Bank. This is where our problems started; the more common greenhoods prospered, but most other species have been a complete disaster. We realise that we are just not destined to be terrestrial growers, and obtaining fresh material for my paintings is always difficult. Luckily the orchid-rich area around Anglesea is less than two hours away with the Brisbane Ranges, and You Yangs even closer. Occasionally, a friend will lend me a pot of beautifully grown plants for a special project.

Since painting that first portrait of *Pterostylis curta*, I have made scores of working sketches, both in the field and from cultivated plants; sold many native orchid paintings; won awards for my watercolours at art shows; and received commissions for specific plants, or orchids of a certain area. One particular request which I found really exciting was to stage a display and sale of watercolour paintings of orchids and butterflies of the Castlemaine District at the Midlands Orchid Show in 1989. This was an enormous success, and lead to requests for similar displays at other orchid shows.

Whereas I do not regard myself as a true botanical artist, my work is never-the-less botanically correct. A few years ago my mother (who also paints) was looking at a work which I had just completed and said, "There is something missing - add a butterfly!" I looked at that painting for weeks before deciding to give it a go. Mum was right - a butterfly did make all the difference! And so I entered into another field of interest. I have had to learn where and when one can expect to see butterflies on the wing. If I wish to include a butterfly, I prefer it to complement the colours of the orchids. But it is no use adding a species because it is colour-harmonious if it does not occur when, and where, the particular orchids are flowering.

It seems hard to believe that I am still using my original box of Windsor and Newton artists quality watercolours that my parents bought for me when I was about ten years old. And even more amazing that I have (and use) a couple of lovely sable brushes which belonged to my grandfather. Of course I have added to and replenished quite a few of those original half-pans with the tubes which are more popular today, and purchased a goodly assortment of new brushes including the 000's which are necessary for fine detail. One of the most crucial aspects of painting, and particularly botanical painting, is to find a paper that suits your style. What suits one person may not necessarily suit another, so it makes sense to try out as many papers as possible to assess the qualities of each. It did not take me long to discover that it is false economy to purchase anything but the best quality I can afford. After much experimentation (and contrary to the preference of the majority of botanical artists), I discovered that Arches FIN cold pressed at 300 gsm (a rough paper) is a sheer delight to work on.

Artists are notoriously self-conscious about sketching in public, and I am no exception. It took enormous courage for me to sneak out my pencils and sketchbook during a field trip when I hoped everyone else was otherwise occupied some distance away. Of course it was not so; there is always someone who will discover you, come and look over your shoulder, and comment on what you are doing. But I can assure you that the first time is the worst, and I can now carry on a rational conversation while completing a working sketch. Another disadvantage about sketching terrestrial orchids out-of-doors is that they are generally of short stature. So one must assume an uncomfortable, cramped position in order to capture its taxonomical details while it sways gracefully in the gentlest of breezes. So it is essential to wear comfortable, loose-fitting clothes and take along a groundsheet to sit on. It is sheer luxury to work in the comfort of my own home with someone's pot of beautifully grown plants in front of me.

If you are going to paint flowers with any real feeling for their essential qualities visible in your work, then you are going to have to care and care passionately for them. They must no longer be passed by as mere objects in a landscape. Every flower is unique for it is different in colour, habit of growth, size and shape from the one growing next to it.

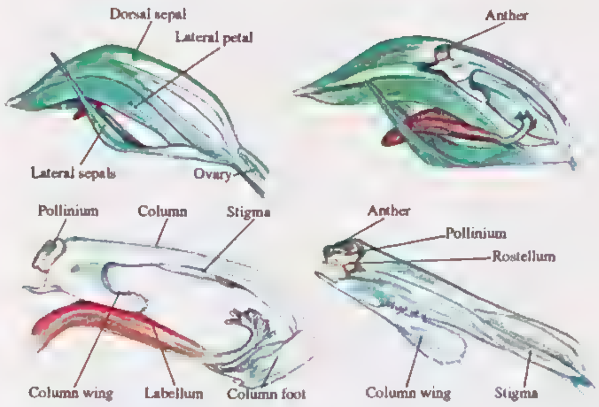
But why paint flowers when twenty or more could be photographed in a fraction of the time? Painting and photography are totally different forms of art. However, I use photographs a great deal as an aid to my work, although I always prefer to paint from living specimens. Painting from sketches or photographs is less satisfactory than working from live material, but it is far better than not painting at all.

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 2: *Pterostylis curta* R. Br.

Common Name: Blunt Greenhood

Subfamily: Orchidoideae
Tribe: Diurideae
Subtribe: Pterostylidinae
Genus: *Pterostylis* R. Br.



Distribution: The genus *Pterostylis* is endemic to Australia and New Zealand. *P. curta* is found in Queensland, New South Wales, ACT, Victoria and Tasmania.

Notes: All *Pterostylis* are terrestrial orchids, but occasionally plants can be found growing on treefern trunks. *P. curta* is the type species for the genus, described by Robert Brown in 1810. It is a colony forming greenhood which flowers in early spring. Mature plants have a basal rosette of leaves and a flowering stem bearing a single flower. All *Pterostylis* have distinctive flowers where the lateral petals and the dorsal sepal are partially fused into a hood, the galea. The galea acts as a trap for pollinators, allowing exit from the flower in one direction only. The labellum of *P. curta* has a counter balance on the inside. This counter balance closes the labellum against the galea, preventing a pollinator from exiting the flower in the direction it entered. To exit the flower, the pollinator must go through the column wings that form a passage past the stigma, the rostellum and the pollinia, and finally out of the flower.

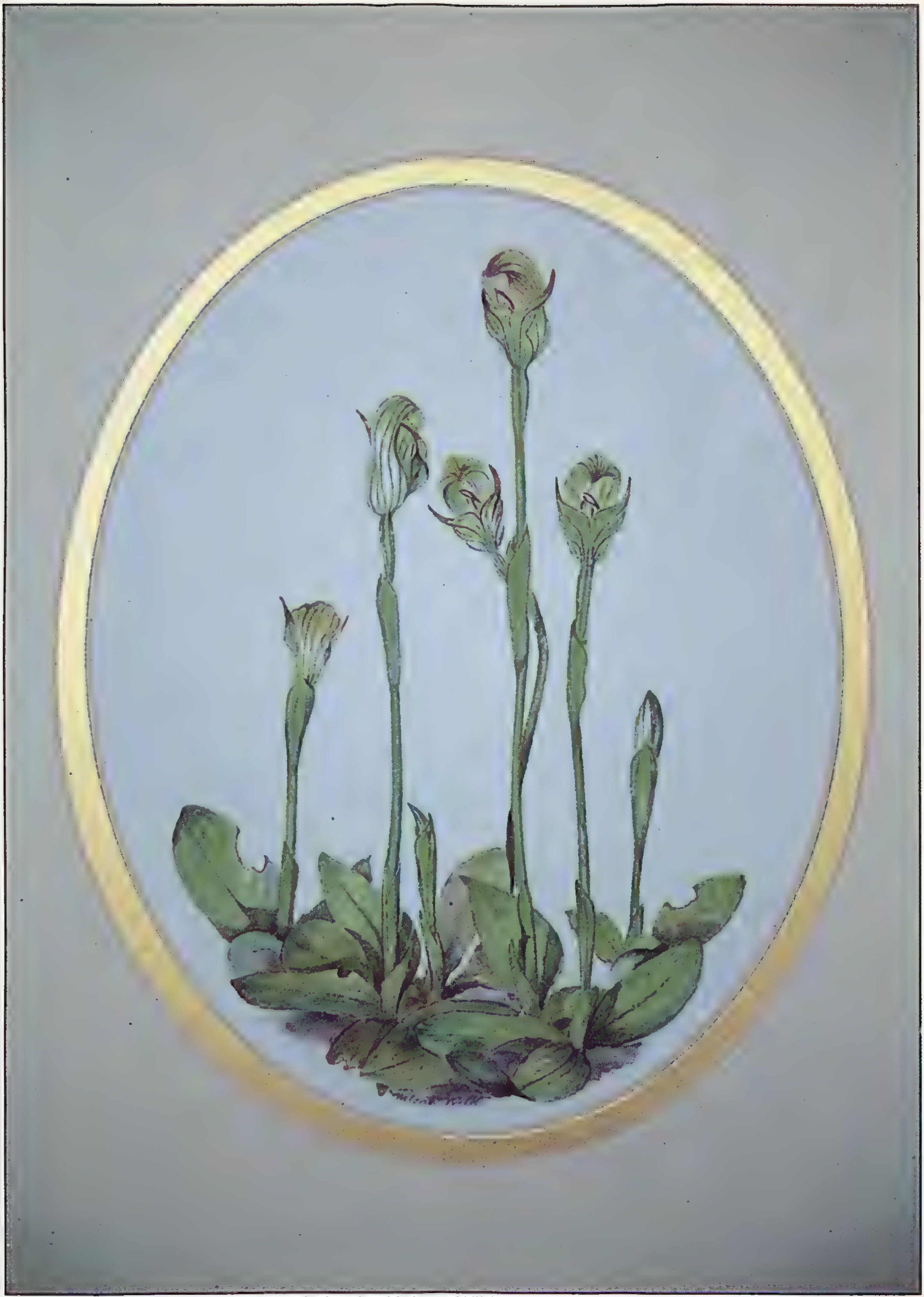
Pollination: There is no recorded pollinator for this species. A few species of *Pterostylis* are reported to be pollinated by fungus gnats.

Conservation Status: This species is not considered to be under threat.

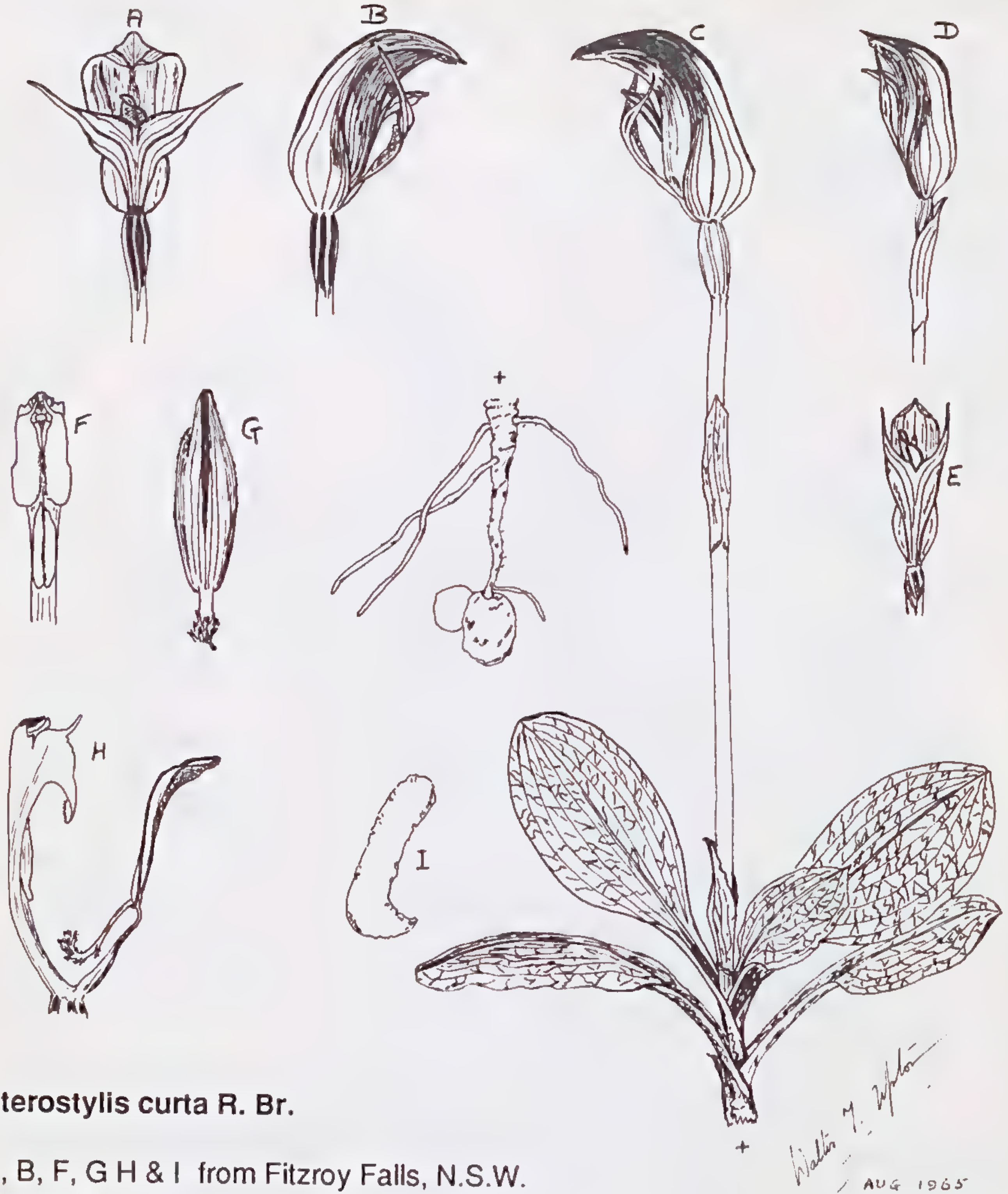
Culture: *Pterostylis curta* is a colony forming terrestrial and one of the easiest terrestrial orchids to grow and propagate. The multiplication rate from new tuberiods is usually from 2- to 5-fold per annum. These orchids grow well under 50% shade in a basic terrestrial orchid mix. Annual repotting is recommended.

Illustration: Illustrated are a number of plants of *Pterostylis curta*; note the solitary flower on each flowering stem. The distinctive twisted labellum can be seen clearly in flowers in both the illustration and the line drawing. Also to be noted in the side view of the flowers are the fusion of the dorsal sepal and lateral petals to form the galea, while the partially fused lateral sepals project up and around the galea.

Description: Tony Slater, 159A Raleigh Street, Thornbury, Vic. 3071
Illustration: Helene Wild, 56 Civic Parade, Seaholme, Vic. 3018
Line drawing: Walter T. Upton, PO Box 215, West Gosford, NSW 2250.



Pterostylis curta R. Br. from a painting by Helene Wild.



Pterostylis curta R. Br.

A, B, F, G H & I	from Fitzroy Falls, N.S.W.
C, D & E	from Bayview, Sydney.

A	Flower front view	1 x
B	Flower side view	1 x
C	Plant	1 x
D	Flower side view	1 x
E	Flower front view	1 x
F	Column front view	2 x
G	Labellum	2 x
H	Column & Labellum side view	2 x
I	Pollinia greatly enlarged.	

Pterostylis curta R. Br. from a line drawing by Walter T. Upton.

DIRECTORY OF ANOS GROUPS AND ASSOCIATED SOCIETIES

QUEENSLAND

- **ANOS Gold Coast Group,** Hon. Secretary, P O Box 582, Palm Beach QLD 4221.
- **ANOS Mackay & District Group,** Hon. Secretary, 98 Bedford Road, Mackay QLD 4740. Tel: (079) 551 631. Meetings 8 pm on 2nd Thursday each month, Andergrove Neighbourhood Centre, Bedford Road, Mackay.
- **ANOS Townsville Group,** Hon. Secretary, P O Box 326, Townsville QLD 4810. Tel: (077) 78 4311. Meetings 8 pm on 1st Tuesday each month, Townsville Orchid Society Hall, Pioneer Park, Ross River Rd, Kirwan.
- **ANOS Wide Bay Group**, Hon. Secretary, 115 Gympie Rd., Tinana QLD 4650. Tel: (071) 215 224. Meetings monthly (7.30 pm on 3rd Thursday of odd numbered months; 11 am on 4th Sunday of even numbered months), Neighbourhood Centre, Bazaar St., Maryborough.
- **ANOS (Qld) - Kabi Group**, Hon. Secretary, Iona Rd., Beerburrum QLD 4517. Tel: (074) 960 131.
- **Native Orchid Society of Queensland,** Hon. Secretary, P O Box 159, Broadway QLD 4000. Tel: (07) 264 3897. Meetings 8 pm on 1st Monday each month, Bread House, 49 Gregory Terrace, Brisbane.
- **Native Orchid Society of Toowoomba Inc.,** Hon. Secretary, P O Box 2141, Toowoomba QLD 4350. Meetings 7.30 pm 1st Friday each month, Red Cross Hall, Hall Lane (off Neil Street), Toowoomba.

NEW SOUTH WALES

- **ANOS Central Coast Group,** Hon. Secretary, 28 Koorabel Ave, Copacabana NSW 2251, Meetings on 3rd Wednesday each month, Temple Kiely Visitors Centre, Dept. of Agriculture Station, Research Rd, Narara.
- **ANOS Far North Coast Group,** Hon. Secretary, 2 Main St, Alstonville NSW 2477. Tel: (066) 24 1023. Meetings on 1st Thursday each month, Ballina High School, Burnett St, Ballina.
- **ANOS Macarthur & District Group,** C. Munson, 8 Corang St, Ruse NSW 2560. Tel: (046) 26 2105. Meetings 8 pm 3rd Monday each month, Escol Park Community Centre.
- **ANOS Newcastle Group Inc.,** Hon. Secretary, 9 Yvonne Close, Belmont North NSW 2280. Tel: (049) 48 6462. Meetings on 4th Wednesday each month, John Young Community Centre, Thomas St, Cardiff.
- **ANOS Port Hacking Group,** Hon. Secretary, P O Box 359, Gymea NSW 2227. Tel: (02) 524 9996. Meetings 8 pm on 4th Wednesday each month, Community Hall, Gymea Bay Rd, Gymea.
- **ANOS Sydney Group Inc.,** Hon. Secretary, 51 Waratah Rd, Turramurra NSW 2074. Tel: (02) 449 9593. Meetings 8 pm on 3rd Friday each month, Baulkham Hills Community Centre, Baulkham Hills.
- **ANOS Warringah Group Inc.,** Hon. Secretary, P O Box 524, Dee Why NSW 2099. Tel: (02) 99 2468. Meetings 8 pm on 2nd Thursday each month.
- **Wollongong & District Native Orchid Society Inc.,** Hon. Secretary, 13 Eleanor Ave, Oak Flats NSW 2529. Tel: (042) 56 1608. Meetings 7 pm on 2nd Tuesday each month, Wollongong High School, Common Room, Lysaght St, Fairy Meadow.

VICTORIA

- **ANOS Victorian Group Inc.,** Hon. Secretary, P O Box 285, Cheltenham VIC 3192. Tel: (03) 583 4278. Meetings 8 pm on 1st Friday each month, National Herbarium, Royal Botanic Gardens, Birdwood Ave, South Yarra (behind the Shrine).
- **ANOS Geelong Group Inc.,** ANOS Lot 2, Newcombe St, Drysdale VIC 3222. Tel: (052) 51 3186. Meetings on 2nd Wednesday each month, Fidelity Hall, Star St, Geelong.

SOUTH AUSTRALIA

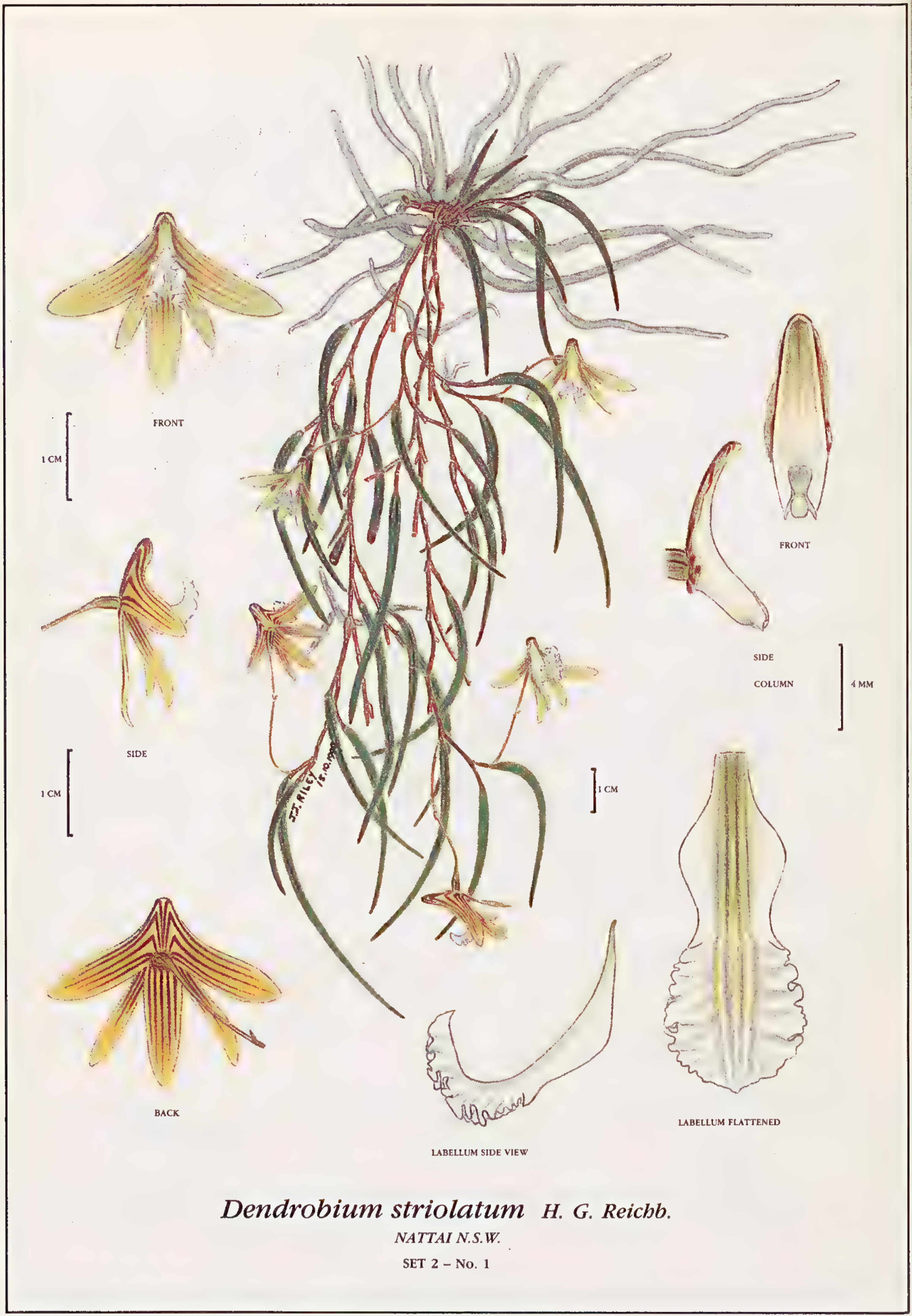
- **Native Orchid Society of South Australia Inc.,** Hon. Secretary, P O Box 565, Unley SA 5061. Tel: (08) 278 2917 or (08) 297 3724. Meetings on 4th Tuesday each month, St Matthew's Hall, 67 Bridge St, Kensington.

WESTERN AUSTRALIA

- **West Australian Native Orchid Study & Conservation Group (Inc.),** Hon. Secretary, P O Box 323, Victoria Park WA 6100. Tel: (09) 378 1278. Meetings on 3rd Wednesday each month, Kings Park Board Administration Centre Theatrette, Kings Park, West Perth.

NEW ZEALAND

- **New Zealand Native Orchid Group**, Convenor, 22 Orchard St, Wadestown, Wellington, N.Z.



Dendrobium striolatum H.G. Reichb. from a painting by J.J. Riley.

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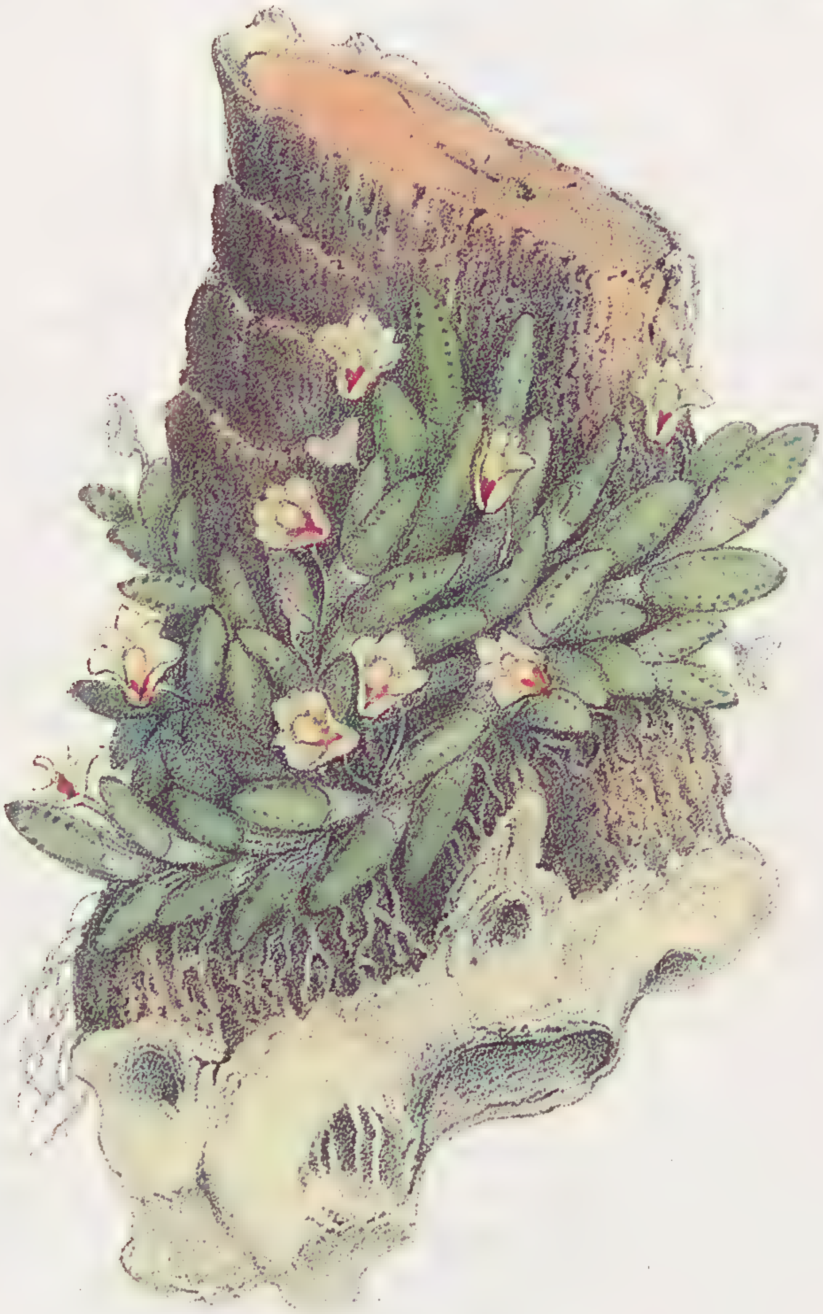

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Rear cover: *Dendrobium kingianum* 'Linda'
Dendrobium kingianum 'Sue'

Royal Botanic Gardens
and National Herbarium

30 JUN 1992

LIBRARY

Articles:
May be submitted to A.N.O.S. Inc., P.O. Box C106, Clarence St. Sydney, N.S.W. 2000, or to the Editor or an Editorial Associate (see addresses below). Manuscripts may be typed, printed or submitted in electronic form on diskette. Good quality colour slides may be submitted with articles. All efforts will be made to return the slide(s) to the author(s) after use.

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TALKING POINT

It is time for a change!

Yes, it is time for a change in the Editorship of *The Orchadian.* As this is my next to last editorial, I wish to take this opportunity to thank those contributors who have made my task an enjoyment, to thank my Editorial Associates and the Production Team for their support and assistance, and to reflect on what has been achieved in the past four years.

Firstly, why the need for a change? My location in Toowoomba prevents me from attending all meetings of Council, and consequently I am somewhat isolated from the "information centre" of the goings-on in the Australasian native orchid world. Furthermore, the arrangement of the Editor in Toowoomba, and the Production Team in Sydney, has not been satisfactory in getting the journal into print and in the hands of the readership on time. It would be far more convenient if the editorial and publications teams were located closer to one another.

I have been worrying about the late publication of *The Orchadian* for some months. Perhaps fortuitously, I had, in January 1992, sent to Barry Collins and each member of the Production Team, a letter outlining what I believed to be the problems of publication of *The Orchadian* under the existing arrangements. Although only two people acknowledged receipt of the letter, at least it started some wheels turning.

I am pleased that Walter Upton and the members of the Central Coast (NSW) Group have taken up the challenge of publication of *The Orchadian.* I hope that the Editorial Associates can be retained to act as referees of material submitted for publication.

Finally, I have been able to include in *The Orchadian* most of the changes I wished to see happen. Over the past four years, the number of pages in each issue has increased from 24 to 48. I hope readers will put pen to paper, and keep articles rolling in so that the new team can maintain, and even increase, the number of pages per issue. With a bigger and better journal we can attract more readers. With more subscribers, we can provide more colour photos, more articles, and more pages per issue.

The Editorial, which I have called *Talking Point,* has been revived; I know a number of readers find it of interest. Furthermore, it provides the Editor with a forum where various views can be expressed. Another forum that has been well received is that devoted to letters to the Editor, which I have called *Readers' Forum.* I believe we have maintained a fair balance between articles of general interest, articles on culture, and original articles on applied and basic research. In recent issues, *Australasian Orchids Illustrated* and *Native Orchid Research* have made their appearance.

It is up to the new Editor to decide if these features are retained. I ask you, our readers, to provide the new team with the support they will need to maintain and improve the quality of *The Orchadian.*

Noel J. Grundon

SHOW REPORT: A.N.O.S. VICTORIAN GROUP INC. 1991 SPRING SHOW

by H. Wild
56 Civic Parade, Seaholme, Vic. 3018.

Saturday, the first really warm, summery day of the season, brought out the crowds - and they flocked in to see our Spring Show. As usual there was a large number impatiently waiting for the doors to open at 11.00 a.m., and our plant sales area rapidly took on the appearance of a bargain basement at sale time. Our sales assistants and cashiers were pretty hard pressed for a couple of hours and, by mid-afternoon, the sales tables were looking decidedly desolate.

The muted cream and pale green colour scheme in the Herbarium set off the orchids to perfection. Our display really did look magnificent. The southern states had experienced a very early flowering season, and consequently, the number of epiphytes was slightly down on those of previous years. As in the past, we had placed tiered benches in the centre of the hall, but this year we featured terrestrials on the lower levels, and large specimen pots of epiphytes on the upper level.

The terrestrial growers never fail to amaze me! Between them they displayed a total of 202 individual pots containing 108 different species or natural hybrids, and five man-made hybrids, including many which had not been benched at previous shows. Which genera were the stars of the terrestrial benches? This was a hard decision to make - Don Smith's pots of *Diuris corymbosa*, grouped together on the top tier, were so tall and robust, and the yellows and oranges so brilliant, the plants seemed to shout "Look at us! Aren't we magnificent!" Then there were the caladenias, some of which were truly outstanding both in colour and size. Helen Richards' huge *Caladenia longicauda*, a white spider-type with a brilliant red labellum, was absolutely stunning, as also was Peter Branwhite's pot of bright yellow *Caladenia flava*. The number of beautifully grown *Caladenia* brought in by Malcolm Thomas was nothing short of amazing, and the Victorian Group has dubbed Malcolm the "King of the *Caladenia*".

It was a very early season for the epiphytes, and there were definitely fewer of them benched this year. Nevertheless, the epiphytes featured on tiered benches on both sides of the hall. They certainly made their presence felt - the perfume was overpowering, and their colours magnificent, ranging from white through pale pink and mauve to deep, vibrant purple, and from palest lemon to strongest golden yellow, and even bright orange. Paul Phillip's pure gold *Dendrobium speciosum* was breathtaking. We do not often see hardcane *Dendrobium* species at our shows, but, at last, we have gained a new member who is growing them to perfection. Eric Wilde, who joined us last year, brought along *D. X superbiens* and *D.* Pauline, and several beautifully cultivated pots of the golden orchid, *D. discolor*. The far end of the central stand was reserved for *Sarcochilus*, and judging by the number of pots brought in this year, the southern form of *S. hartmannii* is experiencing a bumper flowering season.

Although A.N.O.S. Victoria is a non-competitive society, on the occasion of our Spring Show

Right: Massed display of terrestrials at the A.N.O.S. Victorian Group Inc. 1991 Spring Show.
Photo. Loris Peggie.

special cultivation awards are selected. The winners in 1991 were:

Bill Murdoch Prize for the Best Cultivated Epiphyte - Eric Wilde for *Dendrobium discolor.*

Phil Mims Prize for the Best Cultivated Terrestrial - Malcolm Thomas for *Caladenia denticulata.*

Dingley Fern Market Prize for the Best Cultivated Hybrid - Stan Harper for *Dendrobium* Bardo Rose.

A number of plants were also selected as being worthy of Cultural Certificates. They were:

Peter Branwhite - *Caladenia flava.*
Graeme Carr - *Dendrobium toressae.*
Stan Harper - *Dendrobium pugioniforme.*
Bruce Harris - *Dendrobium* Hilda Poxon.
Bruce Harris - *Dendrobium* Jamie Upton.
Stan Hill - *Dendrobium linguiforme.*
Olive and David Howard - *Dendrobium* Hewitt Glow.
Olive and David Howard - *Dendrobium* Wonga.
Frank and Mary Luckhurst - *Dendrobium kingianum.* 'Lipstick'.
Godfred Oesch - *Dendrobium jonesii.*
Godfred Oesch - *Dendrobium* Golden Dorn.
Thelma Spice - *Microtis unifolia.*
Malcolm Thomas - *Caladenia clavigera.*
Malcolm Thomas - *Elythranthera emarginata.*
Malcolm Thomas - *Pterostylis banksii.*
Malcolm Thomas - *Thelymitra X irregularis.*
Alan Webster - *Phaius australis.*
Eric Wilde - *Dendrobium X superbiens.*
Eric Wilde - *Dendrobium* Pauline.

DATE CLAIMER

The A.N.O.S. Warringah Group 1992 Spring Show will be held at Forestville Memorial Hall, Starkey Street, Forestville.

Setting up will be on Friday September 11, from 1.00 p.m. to 8.00 p.m.

The show will open from 9.00 a.m. to 8.00 p.m. on Saturday September 12, and from 9.00 a.m. to 4.00 p.m. on Sunday September 13.

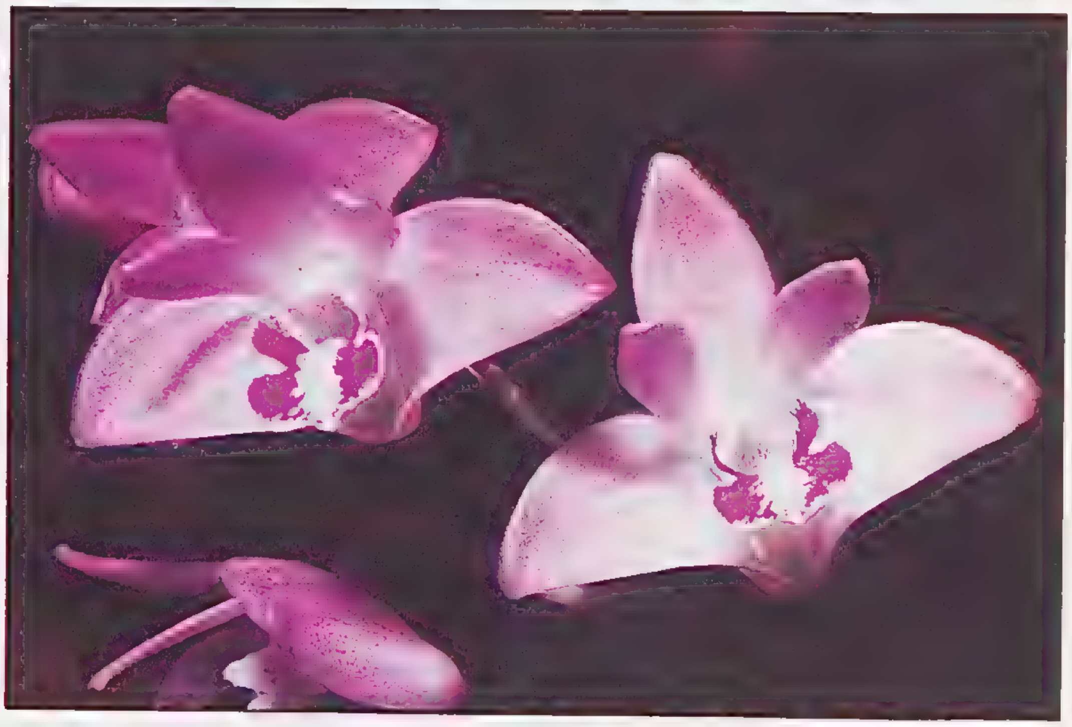
For further information contact the Show Marshall, Chris Arnott [(02)971 9173)].

Right: Massed display of epiphytes make a splash of colour at A.N.O.S. Victorian Group Inc. 1991 Spring Show. Photo. Loris Peggie.

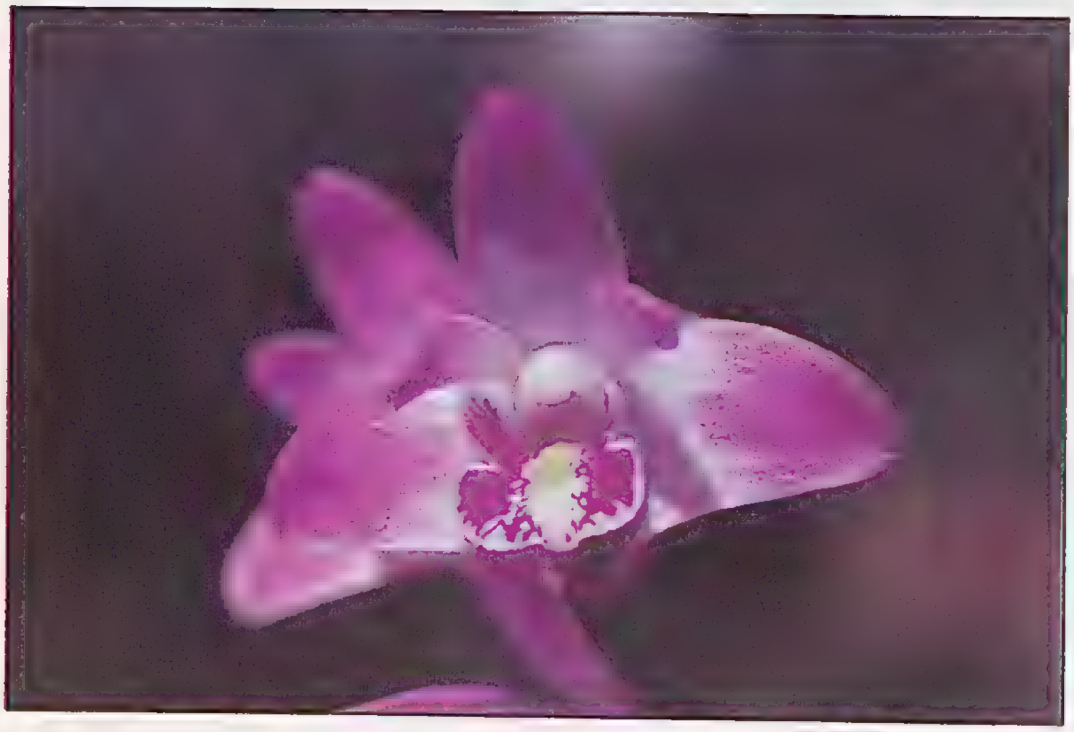
CORRIGENDA

Despite the best efforts of the Editor and the members of the Production Team, mistakes sometimes get through, and the incorrect information is presented. Two such mistakes occurred on page 163 of Volume 10, Number 5, Spring 1991. On that page, two colour photos were reproduced, labelled *Dendrobium kingianum* 'Merrellen No. 2' and *Dendrobium kingianum* 'Merrellen No. 3'. These photos were incorrectly labelled. The photo labelled *Dendrobium kingianum* 'Merrellen No. 2' is a photo of *Dendrobium kingianum* 'Red. No. 2', while the photo labelled *Dendrobium kingianum* 'Merrellen No. 3' is a photo of *Dendrobium kingianum* 'Ha Ha'.

I apologise to Ted and Barbara Gregory of Merrellen Orchids, and to the readers of *The Orchadian* for these mistakes. As a measure of our good faith, we have reproduced here photos of *Dendrobium kingianum* 'Merrellen No. 1' and *Dendrobium kingianum* 'Merrellen No. 2', while on the rear cover of this issue are photos of *Dendrobium kingianum* 'Sue' and *Dendrobium kingianum* 'Linda', the results of line breeding from *Dendrobium kingianum* 'Merrellen No. 1' (See Gregory, T.G., 1991. Line Breeding Australian Dendrobiums. *Orchadian* 10: 160-163.) - Editor.



Right: *Dendrobium kingianum* 'Merrellen No. 1'.
Photo. Ted Gregory.



Left: *Dendrobium kingianum* 'Merrellen No. 2'.
Photo. Ted Gregory.

THE BORDER WONDER: *SARCOCHILUS HARTMANNII* F. MUELL.

J. Roberts
'Tangara', M/S 208 Numinbah Road, Advancetown, Qld 4211.

Sarcochilus hartmannii was described by Baron Sir Ferdinand von Mueller from plants collected on Spring Bluff, just north of Toowoomba, on the Great Dividing Range, Queensland, in the 1880's.

For a description of the plant refer to Dockrill (1969), Bedford (1969) or Jones (1988). As with most species, there is considerable variation in plant form and floral characteristics. Of special note is the flowering stem or peduncle which varies in colour from pale green through to deep purple, or a combination of both colours. In plants growing side by side, either on Blue Knob or elsewhere, the peduncle on one plant can be green, and the next plant can have a deep purple peduncle. Just because it has a purple peduncle does NOT mean it comes from Blue Knob.

DISTRIBUTION

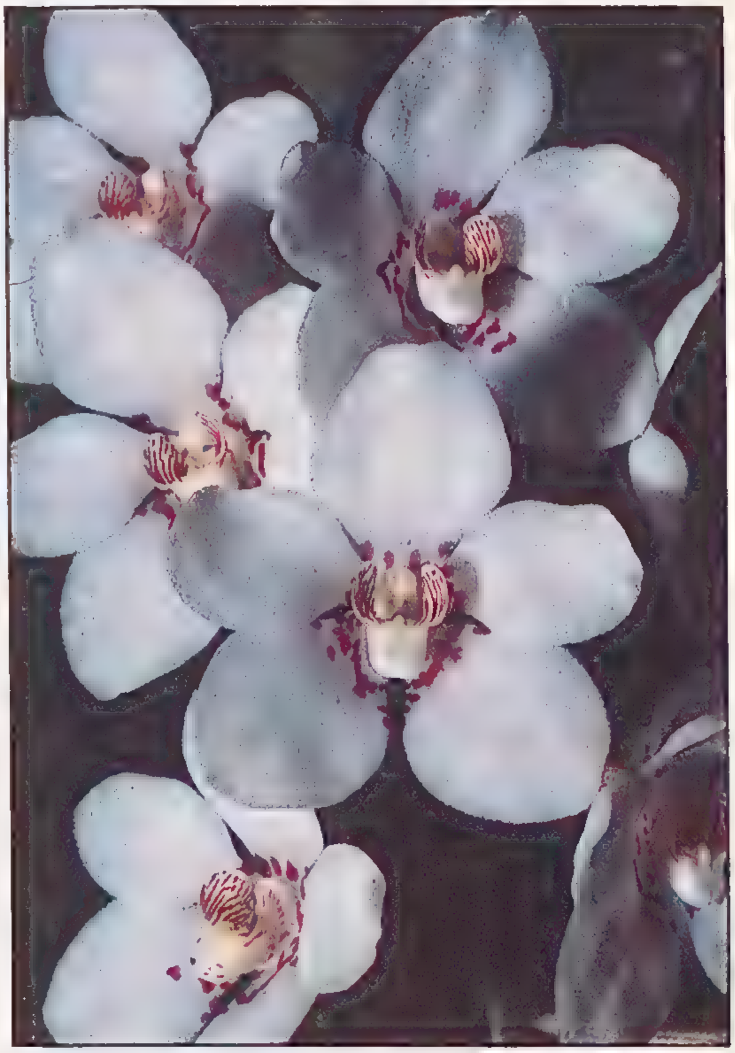
Sarcochilus hartmannii is not as widespread an orchid as its close relatives *Sarcochilus fitzgeraldii* and *Sarcochilus falcatus*. It is mainly confined to the remnants of the old shield volcano known as the Tweed Volcano which covered an area from Ballina and Lismore in the south, the Richmond Range and Mt. Lindesay in the west, to Brisbane in the north. However, *S. hartmannii* has not been recorded from the intrusive rocks in the throat of the volcano which resisted erosion to remain as Mt Warning. (A reputed sighting in 1988 has yet to be confirmed). It also occurs along the Great Dividing Range from Killarney to Spring Bluff.

HABITAT

In most cases, *S. hartmannii* is found as a lithophyte growing on certain types of volcanic rocks in all aspects of the compass, but predominantly in eastern and western aspects. Its altitudinal range is from 600 m to 900 m. This habitat varies from the cool *S. fitzgeraldii* ravine-type environments, to exposed rock ledges and cliffs that are too hot to put your hand on in the midday summer sun. However, *S. hartmannii* keeps its roots cool by seeking out the crevices, and growing into the soil detritus that collects from decaying rock fragments and humus. This detritus has a very open and well drained consistency. At high elevations they receive a wide range in daily temperatures, from cool to cold nights to warm or hot days. Snow, sleet and frosty conditions may be experienced in winter, but air movement is nearly always constant. Even on a hot, still day, there is an updraft on the cliff face. Cloud mists, heavy dews, and late afternoon thunderstorms are a part of this orchid's environment.

CULTURE

I had a lot of trouble growing this orchid. So I decided to learn as much as possible about its



Above: *Sarcochilus hartmannii* — a good clone photographed in November 1987 at the A.N.O.S. Sydney Group Inc. Sarcanthinae Show at the Ryde School of Horticulture, Epping by David Titmus.

environment and cultural techniques. Initially, I made the mistake of growing *S. hartmannii* alongside my *S. fitzgeraldii* in the shadiest part of the bushhouse, and consequently had all the troubles in the world. I have not mastered the art yet, but certainly have learnt that deep shade and little air movement are detrimental to this sturdy and hardy plant. Now I grow them along the western side of the bushhouse, hanging up so that they receive maximum light and air movement.

I do not think mix type or container is of great importance. The main criteria appear to be that the mix is well drained, and the roots are kept on the cool side. In researching the history of the cultivation of *S. hartmannii*, I have found that many successful growers use hanging baskets lined with elkhorn peat with an "anything-goes-mix", and hang the plants over their cymbidiums. An easy and successful way to create new roots on a stem piece of *S. hartmannii* is to put it into live sphagnum moss, anytime of the year.

I have a photo of a clone collected on Blue Knob at least 50 years ago. This plant is still in cultivation today, thus demonstrating that *S. hartmannii* is not a short-term plant. The largest plant I have seen to date *in situ* is a clump (one clone) approximately 60 cm in diameter. The largest stem was approximately 30 cm long.

There is considerable variation in flower size and markings, and in habit of the peduncle. Flowers can be small to large in size, with little or no markings on the tepals around the labellum, while other clones have heavily marked flowers with central spotting of orange-red to brown covering up to one quarter the length of the tepals. As mentioned earlier, the length and colouration of the peduncles vary from one plant to the next.

CONSERVATION

Fortunately, *S. hartmannii* is still a relatively common plant in most areas where it is found. A notable exception is Blue Knob at the end of the Nightcap Range, where three years ago a group of inane collectors almost stripped the area. Please note, Blue Knob is now part of a National Park, and the surrounding properties are owned or occupied by aware, conservation-minded people, and many will confront you with a shot gun if you are caught trespassing! National Park rangers also patrol the area rigorously. I hope I get to see the famous Blue Knob form *in situ* before it is too late!

Another exception is the Springbrook Plateau where *S. hartmannii* has been wiped out. Here the plants grew on the rocks, boulders and rock outcrops, but dairy cows ate many of them years ago. When dairying ceased, the kikuyu grass and mist-flower (a noxious weed that kills out even kikuyu grass) claimed the rest by smothering them.

In some areas, smothering by lantana, mist-flower and crofton weed is becoming a serious problem, notably mist-flower which is now a major problem for all lithophytes in the shield volcano area. This includes all the National Parks and Reserves throughout their entirety, not just the perimeters; it is spread by wind and water.

Fire is a big menace during droughts or by National Park rangers burning off. Everything burns with such heat that even *Dendrobium speciosum* var. *hillii* plants are killed; *S. hartmannii* has no hope of surviving these conditions. Hopefully seed from nearby areas will regenerate these burnt out areas in time.

I have not mentioned the southern form which is found in the northern reaches of the Manning River system (found in October 1989) to the Macleay River system. It is generally accepted that this form is distinct and separate from the northern race, and that sooner or later it may be raised to varietal or specific rank. Plant habit is more vigorous than the northern form with larger but thinner leaves. The southern form flowers approximately a month earlier than the border form, and the flowers tend to open simultaneously. The flowers are a cream to yellow in colour with or without light brown blotching.

A recent reference to a sighting of *S. hartmannii* in the Washpool National Park, an area which is about mid-way between the distributions of the northern and southern forms, has yet to be confirmed by knowledgeable growers of *S. hartmannii* or the botanists at the Canberra National Botanical Gardens. However, it is anticipated that it would be the border form.

END NOTE

In collaboration with David Jones, Botanist of the National Botanic Gardens in Canberra, I am studying the history, distribution, habitat, and cultural techniques of *S. hartmannii*. We would appreciate receiving any information on the following:

1. Knowledge of the extreme limits of distribution of *S. hartmannii*: (a) south of Killarney, and (b) to the north of Spring Bluff on the Great

Dividing Range.

2. Information or contact person on the Nambour form as it is referred to.

Any information, no matter how insignificant it may seem, often leads to a breakthrough in research of this nature.

Please send the information to either myself at the address at the head of this article, or to David Jones, Australian National Botanical Gardens, G.P.O. Box 1777, Canberra, ACT 2601.

REFERENCES

Bedford, R.B. 1969. *A Guide to Native Australian Orchids.* Angus and Robertson, Sydney, p. 115.

Dockrill, A.W. 1969. *Australian Indigenous Orchids Volume 1.* The Society for Growing Australian Plants, pp. 720-721.

Jones, D.L. 1988. *Native Orchids of Australia.* Reed Books Pty Ltd, Frenchs Forest, p. 567.

MY WAY OF GROWING ORCHIDS

R. Hill
65 E.K. Avenue, Charlestown, NSW 2290.

INTRODUCTION

I am prompted to write this article because of the lack of hands-on information on growing orchids that is available to new growers. These lucky souls are about to enter a most satisfying addiction that will stay with them all their lives.

I can recall my early days of struggling to come to terms with a set of funny names. However, the most daunting thing about growing orchids at that time was a cliquey, closed membership that did its best to ignore you and not to share the thoughts, ideas and methods which instil confidence and make the way easier.

STARTING OUT

My idea of starting an orchid collection was to purchase a few unflowered seedlings instead of a flowered plant. I would buy two of anything, particularly those with *Dendrobium tetragonum* and *D. fleckeri* as a parent. I prefer these species as parents because they extend the normal spring flowering time. Out of the hundreds of seedlings that I have bought over the years, one was *D.* Aussie Child 'Avril'. Last year this plant was awarded HCC-AD/AOC-NSW [Ed. - In 1991, this orchid was selected as *Award of Distinction of the Year* by the Australian Orchid Council.].

You cannot be guaranteed a champion out of a flask, but the more plants you have of a particular cross, the greater are your chances of getting a really good one. If the thought of thirty seedlings seems too many, share some with a friend or two. This keeps the cost down and increases the fun of orchid growing, as well as keeping the seedlings in a close circle.

POTTING MEDIA

You will need two sizes of southern Red Radiata bark: the fine bark for seedlings and the medium size for more mature plants. Do not use flaky Slash Pine bark because, if it dries out, it is almost impossible to wet again. Currently, there is a fad about using treated bark. I have found that treated bark certainly gives better results than untreated bark. I maintain that if the untreated bark is soaked in hot water plus a squirt of bio-degradable detergent, the untreated bark can be used without further weathering. It takes about three weeks to wet the bark completely and release the tannins and phenolic resins. The bark is then washed thoroughly until the colour stops flowing out of the bark. After being partially dried, it is ready to use. I am sceptical about the use of chemicals when treating bark because the first action after soaking the bark is to wash the residue from the bark. However, it may be advantageous to saturate the bark with nitrogen in the form of urea, and to add lime to sweeten the mix. The addition of any other chemicals seems pointless; I would rather give my plants a quarter strength feed often enough to get results.

River gravel is a good aggregate. I have used blue metal with good results. I am presently trying Rhylite, the white decorative stone seen in gardens, walk ways, etc. If you use aggregate, you will require about four sizes: 5 mm, 10 mm, 14 mm, and possibly 20 mm for large specimen plants.

Round or square squat plastic pots are the best for natives. A range of sizes from 50 mm, 80 mm, 115 mm to 140 mm will cover your requirements for quite a few years.

DEFLASKING AND GROWING-ON OF SEEDLINGS

There are many methods for deflasking orchids. I use the two-ice-cream-containers approach. The first container is filled with rainwater into which I put 5 ml Wuxal® and a few drops of Plant Hormone®. The contents of the flask are hooked out with a piece of wire, dropped into the Wuxal solution, and the seedlings separated from each other. The second container has 5 ml Guardex®, a mild fungicide, plus water. The separated plants are soaked in this solution for about 5 minutes. Before the seedlings are planted into 50 mm tubes, I add enough 7 - 10 mm gravel to cover the drain holes in the tubes.

My seedling potting mix is 55% fine treated bark, 45% 5 mm river gravel, and an optional 10% Perlite®. When the potting is finished, add the label with as much information as possible: hybrid name, hybridisers initials if known, deflask date, etc. The next and probably most important step is to thoroughly water the seedlings with a good fungicide. I use Fossjet 200® which stops the plants from damping off. Then the tray of seedlings is placed on the gravel floor of my cool house or shadehouse. After two days, I spray with fungicide again. I mist the plants if they appear to be drying out. After about a week of this care, the seedlings can be put into your normal growing area.

Seedlings will grow in a shadehouse, but their growth tends to slow down in winter. I grow my seedlings in a cool glasshouse. I like to deflask in spring or early autumn, but not during summer.

Never let the seedlings dry out. Unlike mature plants, they have no reserve of moisture. Water with rain-water if possible.

In summer, I water my seedlings and fertilise them on alternate days. I prefer to use the trace element type of fertilisers, similar to Wuxal. Trygon Field Pack® or Fish Emulsion® are used as organic fertilisers, plus the addition of Plant Hormone each time I fertilise. Approximately once a week, I will use Johnson's Modified Formula. In winter, I water my seedlings twice a week, but the mature plants get watered once a week.

By the following spring, the seedlings can be repotted into 80 mm pots using a small percentage of seedling mix and 55% medium bark and 45% 10 mm gravel. The plants are then transferred to my shadehouse.

CARE OF MATURE PLANTS

Plants which have almost filled the 80 mm pots are transferred to 115 mm pots using a potting mix of 10 - 14 mm gravel and medium bark. The next shift is from 115 mm to 140 mm pots using a potting mix of 14 mm gravel and medium bark. For plants in 140 mm pots and larger, I fill the pot with broken up polystyrene foam to about a quarter or one-third of its depth.

Many of the transfers from 50 mm pots to the 140 mm pots can be done by potting-on rather than repotting. Potting-on is simplicity itself. The first step is to remove the label, and, if the writing is faint, re-write the label. I use a Stabilo 8008® pencil. Place the label in a special position, because if you are about to pot-on a hundred or so seedlings, you will need to know what label applies to the plant you have in your hand.

Hold the plant in one hand and give the pot a squeeze to loosen the plant and mixture in the pot. The plant should pop out with most of the potting mix still attached to the roots. Select a pot of the next size up, and, holding the base of the plant level with the top of the pot, fill in around the plant with fresh mix, gently tapping the side of the pot to settle the mix. I completely change the mix only when the plant has a problem, or if I have bought plants from a commercial grower who does not use gravel in the mix.

FERTILISERS

I fertilise on a 5 - 7 day cycle with as much variety of fertiliser as possible. I never water prior to fertilising because, on my watering schedule, the root ball is damp and not dry when I begin fertilising, and the use of quarter strength fertiliser does no harm. A good flush through the pots is essential and should be carried out weekly or monthly to remove residual salts.

The best money I have spent on orchids was to buy a Hyponex® proportioner. This attachment works well on a short length of hose (20 m), and allows you to fertilise your orchids with the same ease as watering them.

I have used Johnson's Modified Formula on my orchids for years. The Hyponex ratio is 30 g Aquasol®, 5 g magnesium sulphate, 2.5 g chelated iron, and 50 ml Plant Hormone, dissolved in 15 litres of water. Fish Emulsion, at the rate of 500 ml per 15-litre bucket, provides good organic fertiliser. Towards the end of the growing season, I like to use Campbells Yellow® fertiliser as a blossom booster.

FUNGICIDES AND INSECTICIDES

The main thing is protection for yourself! Fungicides and insecticides are poisons that are easily absorbed through the skin on the inside of forearms and forehead. You need long trousers or overalls, a long-sleeved shirt, rubber gloves, a broad brimmed hat, and a good quality respirator. The respirator should be fitted with the correct mist filters. **If you can smell the chemical in use, you ARE NOT PROTECTED!**

Fungicides should be used as a preventative measure. I spray as often as necessary to cover the newly formed leaves. During the growing season, this can be every few weeks. I prefer the wettable powder types similar to Bravo®, Daconil®, Mancozeb®, and Zineb®. These fungicides control a wide spectrum of fungi. I also use Fossjet 200 or any other fungicide on a rotating basis. A wetting agent helps to obtain a good even coverage of the leaves.

Insecticides are a different story. You spray when you have a problem. I use Carbaryl® or Dipel® for caterpillars, Omite® for red spider, and, at the first sign of aphids, I spray the whole collection with Pirimor® which gives 12 weeks protection and will not hurt the flowers. A mixture of Malathion® and White Oil® is the same as Maliscale® and will control scale infestation.

WATERING

This should be a personal thing based on many factors, including temperature, air movement, locality, etc. I use a Moss® misting system controlled by a timer set to give 12 - 15 minutes watering as required. I tend to water in the evening in warm weather, and in the mornings in cold weather.

CULTIVATION NOTES ON *SARCOCHILUS OLIVACEUS* LINDLEY

D. Smedley
P.O. Box 890, Baulkham Hills NSW 2153.

I started growing native orchids in 1977. Since then I have been fairly happy with the results of my cultivation techniques for most species of most genera. Like many of us with the orchid bug in this part of NSW, I started out with a mixed collection of cool-growing epiphytic genera. However, *Sarcochilus olivaceus* was the one species that constantly disappointed me, or did I disappoint it?

I did what I could to duplicate what I then knew about the natural habitat of the species, the plants being hung in the shadier areas of my various growing structures. I started out with a bench under the gum trees, and then I built a shadehouse from scrap timber and 70% shade cloth in the sunniest part of the yard. As with the rest of the collection, *S. olivaceus* was watered in summer during the cooler parts of the day, decreasing to once a week during winter. My fertilising programme consisted of applications of proprietary nitrogen-based concoctions in the warmer months when I got around to it.

I got caught up in the boom in compressed cork in the late 70's and early 80's, and used almost exclusively 30 cm x 2.5 cm x 2.5 cm totems of this material as mounts. The mounted plants of *S. olivaceus* were hung on the walls of the shadiest part of the shadehouse. Thrive? Not on your life. Most plants lost their larger leaves, and slowly reverted to leafless stems with two small leaves at the end. Root growth was poor compared with that observed in the wild, not many roots growing longer than 15 - 20 cm. I knew I could not cultivate this orchid well, and mostly ignored it.

A change of residence in 1985 allowed me to completely review and revise my cultivation methods. Ever bought a house because it has more sunshine in the backyard for orchid growing? A great reason to move.

With more space and better facilities, I could experiment a bit more to find the best place in my new store-bought 50% shadehouse. I located the structure in a more open position where the plants benefited from increased air movement compared with that available to them before. The new shadehouse receives full morning sun, and is shaded from the intense summer afternoon sun by two mature gum trees immediately to the west of it. The collection receives maximum available light in the winter months because the aspect to the north is virtually unimpeded by tree-growth or buildings.

The *S. olivaceus* plants were hung under the top shelf of a two-tiered weld-mesh bench inside the shadehouse. Pot-grown *Sarcochilus* species occupied the top shelf, and various seedlings undergoing the hardening-off stages occupied the lower bench. The *S. olivaceus* plants have not been moved since then because they now appear to thrive in their new situation.

The watering regime has also been improved by the installation of a computer-controlled watering system that delivers pre-determined amounts of water at selected times on chosen days. This is a fabulous addition to the hobby because not only does it water the plants, but it also promotes peace and harmony in the household since the spouse no longer has to take reluctant charge of damping down during the hot summer months!

Another variation in cultivation was the type of totem employed. Specimens of newly obtained *S. olivaceus* were mounted on longer, thinner totems of hardwood, red cedar, and Asian teak about 60 cm long. The difference in response of plants placed on the two types of mount has been quite marked. Even though the cork mounted plants responded to the new environment, those on the new mounts surpassed them in root growth and general condition. Leaves were larger and more robust, roots grew longer (up to 60 cm or more), and the best specimen has had 2 - 3 inflorescences with up to 19 flowers on each.

I suspect the ability of the natural timbers to retain more water on the rough sawn surface contributes in some way to the new-found well-being of the *S. olivaceus* plants. Perhaps the view of some growers that, over time, the glues used in the compressed cork break down and retard orchid growth has some credibility here. One can only speculate at this stage.

The collection generally has benefited from a more regular fertiliser programme, and there is no doubt that the results now obtained with *S. olivaceus* are also related to this change. I readily embraced the ideas of Johnson (1984) and his addition of magnesium sulphate and chelated iron to commercial nitrogen-based fertilisers. I have used his fertiliser recipe for over six years now without any difficulties. Of course, all we growers are prone to tinkering with systems with the aim of doing just that little bit better from one year to the next. Accordingly, at each fourth watering, I use an organic fertiliser with an N:P:K ratio similar to that of Johnson's formula. Organic fertilisers often contain essential plant growth substances such as gibberellins and vitamins. The provision of organic material to orchids also fosters essential bacterial activity around the roots, especially in potting mixes. I think it helps on the totems as well.

In summary then, I believe this species now does well for me because I am able to provide it with a cool shady location, long natural totems to support it's extensive root system, good air movement in a humid environment and a regular, but weak, application of a high quality and plant-friendly fertiliser.

Wait a minute, I just described the conditions of a forest gully, with constant air movement and cool, moist conditions where *S. olivaceus* can be found growing in large numbers on trees and occasionally on rocks in the creek, or on lianas in adjacent areas. Of course I have, and the main message of this article is that the great majority of epiphytic species respond to cultivation that attempts to replicate the natural environment. We can move them around to shadier or sunnier parts of the bushhouse or glasshouse, and we can give them a moss-covered mount or a bare totem or even a pot. Some will appreciate copious quantities of moisture, while others will be adequately served by natural rainfall. With this in mind, we must do what we can within the limitations of our growing structures and our cultural practices to provide our orchids with a place, not to just exist and then suffer the inevitable decline, but a safe place within which they can grow and prosper.

Simple isn't it? But I still can not get those *Sarcochilus australis* to do any good! But that's another story.

REFERENCE

Johnson W.R., 1984. A simple liquid nutritional programme for orchids. *Australian Orchid Review* 49 (3): 197-204.

DRAWINGS BY J.J. RILEY

John Riley has kindly provided A.N.O.S. Council with a series of watercolour prints of his work. These prints are available from Mr Bob Napier, Hon. Treasurer, A.N.O.S., P.O. Box C106, Clarence Street, Sydney, N.S.W. 2000. More information of this offer is available from the advertisement on the centrefold pages of this issue.

"RED" SPECIOSUMS

G.R. Wirth
Pimlico, NSW.

My introduction to the "red"-flowered form of *Dendrobium speciosum* came as quite a surprise to me some three years ago. Being a *D. speciosum* freak, I have been collecting all varieties and colour forms for a number of years, and have them growing at ground level around our swimming pool, and hanging in wire baskets under shade cloth.

One morning in early August 1989, the flowers on one recently acquired clone opened with intense spotting that gave a red appearance. I put the plant in a safe place away from the inquiring hands of visitors, and watched each flower as it opened. Over the next month, two other recently acquired clones opened with flowers that were also spotted with red pigmentation. Another two clones flowered for the first time in August and September 1990, also with red pigmentation on the flowers.

So started my activities with the "red" speciosums. I sent photos of the flowers to Steve Clemesha and Ted Gregory for their comments.

The history of the clones I have is very interesting. In 1987, John Newton, a well-known grower of Australian native orchids from Queensland, gave me a quantity of *D. speciosum* clones that included four that have spotted flowers. The fifth clone was obtained from another Queensland source.

I decided to give them all clonal names that started with 'Red':

1. *D. speciosum* var. *curvicaule* 'Red Prince'
2. *D. speciosum* var. *curvicaule* 'Red Tsar'
3. *D. speciosum* var. *curvicaule* 'Red Star'
4. *D. speciosum* var. *curvicaule* 'Red Spot'
5. *D. speciosum* var. *curvicaule* 'Red Denis'

Their origin is very interesting, and I am sure will create a lot of discussion as more information comes to light. My own observations are that three of the clones from John Newton come from Northern Queensland, and the other from another location. The condition of the clones when I got them indicated that they came from a fairly hard-growing area. However, after four years in cultivation, they have responded well, and their growth and condition are now remarkable.

I believe that Steve Clemesha correctly described the colour of the flower when he stated ".... this desirable clone exhibits deep cream flowers with distinctive deep purple spots." (*Australian Orchid Review* 55: 6 (1990)).

The colour, which has been loosely called "red", is in fact a grouping of deep purple spots. The more spots there are the greater the impression of a solid reddish block of colour, but it is really a deep purple. On all my clones, the amount of colour varies from flower to flower, and from clone to clone, some of the tepals having the reddish purple colour for up to half their length, and some labella being coloured for up to three-quarters of their length.

My culture of the "red" speciosums is similar to that of my other clones, and is generally similar to that of the other growers in this area. The plants receive plenty of sunlight, as much as half a day of full sunlight from April until the flower spikes and buds become visible. Once the flower spikes are visible, I move them under dappled shade until flowering is over.

I water the plants and apply fertilisers regularly during the period of growth and development of the flower spike.

From August through to February, I inspect them at least once a day for the presence of the Dendrobium beetle.

Mike Symmons, Denis Lynch and I have been using the "red" clones in a breeding program. Our first stage involved crosses between the "red" clones themselves, and between the "red" clones and a good form of *D. speciosum* var. *grandiflorum* and a good *D. kingianum.*

Our second stage was completed in 1991, and involved all combinations of crosses between the "red" clones, as well as some crosses between the heavier coloured "red" clones and some of Denis Lynch's champion yellow *D. speciosum.* Our hope here is to achieve another really exciting colour form. We also pollinated two quite vigorous *D. speciosum* var. *pedunculatum* with pollen from the "red" clones in an attempt to improve the habit of the flower spikes and the presentation of the flowers. Wider hybridising with other *Dendrobium* species must wait for later seasons; we want to get the slower growing crosses away first and not overload the plants.

SOME THOUGHTS ON THE GENUS *PARASARCOCHILUS* DOCKR.

Rev. P. Dunstan
9 Main Street, Clunes NSW 2480.

A transfer to Clunes, NSW, re-united me with my native orchid collection, and rekindled my interest in our native epiphytic species and their taxonomy. As I began this task, my attention was drawn to three orchids variously referred to as:

1. *Sarcochilus hirticalcar* (Dockr.) M. Clements & B. Wallace, or *Pteroceras hirticalcar* (Dockr.) Garay, or *Parasarcochilus hirticalcar* Dockr.
2. *Sarcochilus spathulatus* R. Rogers, or *Pteroceras spathulatus* (R. Rogers) Garay, or *Parasarcochilus spathulatus* (R. Rogers) Dockr.
3. *Sarcochilus weinthalii* Bailey or *Parasarcochilus weinthalii* (Bailey) Dockr.

What puzzled me most was that, although David Jones (1988) utilised the generic name *Parasarcochilus* in the main body of his book (p. 544), in the supplement (p. 635) he noted that M. Clements and B. Wallace placed the species referred to as *Pteroceras hirticalcar* in the genus *Sarcochilus*, but makes no reference to *Pteroceras spathulatus*. So I decided to do a bit of study of my own.

Excellent descriptions and diagrams of the species concerned were provided by Dockrill (1969), who also described the genus *Parasarcochilus* Dockr. In this new genus, Dockrill placed three species that had been previously included in the genus *Sarcochilus*, namely *P. hirticalcar, P. spathulatus* and *P. weinthalii*. In his opinion, these species, while very closely related to the genus *Sarcochilus*, did not adequately meet the criteria for that genus. In particular, each species lacks labellum calli, although there may be hairs on the inside of the labellum spur.

In 1972, Garay reduced the genus *Parasarcochilus* to a synonym of the genus *Sarcochilus* and returned *P. weinthalii* to that genus. At the same time, Gray transferred the other two species to the genus *Pteroceras*. However, reference to the generic description of *Pteroceras* Hasselt ex Hasskarl reveals that this genus is characterised by having only two pollinia compared with the four pollinia in *Sarcochilus* (Lavarack and Gray 1985). This move was unfortunate because each of the three species included by Dockrill in his genus *Parasarcochilus* has four pollinia not two, and no doubt this was at least one of the reasons why David Jones retained Dockrill's genus *Parasarcochilus* for *P. hirticalcar* and *P. spathulatus*, although apparently agreeing with Gray's return of *P. weinthalii* to the genus *Sarcochilus*.

Therefore, it would seem that the question facing taxonomic botanists is, firstly, whether or not the genus *Parasarcochilus* is valid, and secondly, if so, which species should be included in it or in the genus *Sarcochilus*. Additionally, it might be asked which species should be included in the genus *Rhinerrhiza* which according to some botanists should include two species, *R. divitiflora* and *R. moorei* (Clements 1989), despite the latter lacking the distinctive "raspy roots" that are otherwise typical of the genus *Rhinerrhiza*.

It may be that DNA or allozyme tests may resolve our dilemma. Until that is achieved, it would seem appropriate to retain the genus *Parasarcochilus* Dockr., and to include in it *P. hirticalcar* and *P. spathulatus*, leaving the third species *P. weinthalii* in the genus *Sarcochilus* since it has more affinity with the other species of that genus than it has with either of the other two species included in the genus *Parasarcochilus* by Alick Dockrill.

[Ed. - Clements (1989) transferred both *P. hirticalcar* and *P. spathulatus* to the genus *Sarcochilus*, stating that they are ".. equivalent to those in *Sarcochilus* except for some details of the labellum. Since these differences probably reflect developments of tissue associated with an adaption to particular pollinator rather than representing a major genetic change .." they are ".. better placed in *Sarcochilus* which is the earlier named genus." He also stated that ".. these two species do not belong in *Pteroceras* since they lack some of the essential characteristics of plant habit, flower form and phenology found in this Malesian genus."]

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APHID CONTROL

S. Bell
12 Castlefield Square, Wantirna, Vic. 3152.

[Ed. - This article was first published in the *A.N.O.S. Victorian Group Bulletin - December, 1991*. p. 9.]

CLASSIFICATION

Common Name: Aphid, Greenfly, Blackfly, Plant lice.
Scientific Name: *Myzus persicae*
Family: Aphididae
Order: Hemiptera

HOST RANGE

A wide range of plants and weeds including roses, peach trees, citrus trees, *Ficus* plants, Brassicae-type vegetables and weeds, orchids and ferns, are commonly host plants.

FEEDING HABITS

Aphids feed on the sap of young succulent new shoots, flower buds, flower parts, older leaves and, in some cases, the roots of plants. Feeding is carried out via a sucking action through mouth parts that form a stylus.

Aphids pierce the outer layers of the plants with their stylus, locate the sap cells, and commence feeding on the sap. While feeding, aphids tend to exude honey dew, a sweet sticky substance, from their rear.

Damage to the plants by aphids when feeding often results in the destruction and death of the plant cells, thus causing the wilting and deformity of young shoots, leaves, buds and flowers.

When feeding, aphids are also responsible for the transmitting of virus diseases via their stylus, as they move from one plant to another.

LIFE CYCLE INFORMATION

Aphids undergo an incomplete metamorphosis, that is from eggs to nymph to adult. Prior to winter, mating occurs and eggs are laid. In the spring, young nymphs hatch out; all are females. From spring to autumn, the aphids do not require males to reproduce. The females continually produce more females, and numbers increase rapidly, depending on the temperature and availability of food. In the autumn, winged males appear parthenogenetically, and the cycle starts over again. Winged insects can also be produced at other times depending on the availability of food.

As the aphid grows bigger, it discards its smaller outer skin, which is often seen on the leaves below where they are feeding, and are a telltale sign of their presence. Other signs of their presence are the shiny, sticky honey dew that they exude while feeding (again this also falls onto the leaves below), black sooty mould that grows on the honey dew after a while, and the noticeable presence of ants. The ants are attracted to the honey dew and often 'farm' the aphids to maintain their supply.

CONDITIONS

Frosts, cold weather, heavy rain and excessively dry heat all serve to reduce the aphid population. Unfortunately they are also the same climatic conditions from which the orchid grower protects his or her plants. Consequently, in creating a micro-climate that is conducive to orchid growing (i.e. a glasshouse or bushhouse type construction), the orchid grower also creates ideal conditions for aphids.

CONTROL MEASURES

Surface coating of plant parts with a poison that acts on the insect's stomach is ineffective. Unlike caterpillars, aphids do not eat plant parts. Therefore the types of poisons to use are in the main contact poisons, systemic poisons and fumigants (Table 1).

Contact poisons have to be sprayed onto the insect. They are poisons that pierce the outer coating of the insect and destroy the insect's organs or nervous system. Other poisons suffocate the insect by blocking their spiracle openings (openings in the body wall of the insect).

Systemic poisons, which are sprayed onto the plant, enter the sap system of the plant, and are translocated around the plant via the sap (although some are only localised in the plant). As the aphid locates the sap cells with its stylus and sucks up the sap, it also sucks up the poison contained within the sap. These poisons act upon the insect's nervous system.

Fumigant poisons such as pest strips, 'bombs' or fumigators provide poisonous fumes that enter the spiracle opening in the insect, and destroy the insect's nervous system.

Table 1. Poisons used in the control of aphids.

Common name	Active ingredient	Type	Comments
Metho mix	Methylated spirits	Contact	50/50 water and metho; burns insect
Clensel	Potassium oleate and Citronella	Contact	Only good for small numbers; must spray daily for 2-3 days; marks flowers
Miscible oil Winter oil White oil Summer oil	Hydrocarbon, paraffin, petroleum	Contact	Also good for scale and mites
Malathion	Maldison	Contact	Covers a range of insects and mites
Pyrethrin	Pyrethrin, Piperonyl butoxide	Contact	Natural pesticide; plant source (Chrysanthemum); combination spray
Rogor	Dimethoate	Systemic	Broad spectrum spray; good for mites and scale also
Pirimor	Pirimicare	Systemic	Systemic to roots as well as leaves
Folimat	Omethoate	Systemic and contact	Active for mites also
Pest strip	Dichlorvos	Fumigant	Use in glasshouse or bushhouse

Other control measures that can be used include the introduction or encouragement of natural predators of the aphid, such as ladybird beetles, lace wings, and parasitic wasps. A fine jet of water, while not practical on seedlings, can be used to knock the aphids off the plant. A bright yellow board, about 600 mm x 150 mm and coated with grease, can be hung horizontally in glasshouse or bushhouse. Aphids are attracted by the bright colour and stick to the grease. Another non-toxic method is to wipe them off between the finger and thumb.

POINTS TO NOTE

Maintain 'plant vigour'. Apart from attacking new growth, insects also attack plants that are in poor condition. Therefore, try to maintain healthy, vigorous growth in plants.

Remove all sources of infestation, such as weeds. Also treat infested garden plants in close proximity. Regularly check the orchids (daily) for insects, not only the top leaves, but also the base of the plant where new growth appear, and on the underside of the leaves.

Only mix enough spray for your immediate use.

Develop a regular spraying programme, and do not spray indiscriminately. If insects still persist after a spraying programme, change to another insecticide; insects become accustomed to one type of spray.

Most sprays are dangerous. Read the instructions carefully. Cover your head, and expose as little skin area as possible when spraying. Wear a mouth or nose filter, and wash your hands and face with soap and water when you have finished spraying.

BOOK PREVIEW

THE ORCHID MAN: THE LIFE AND MEMOIRS OF THE REV. H.M.R. RUPP 1872-1956

By Lionel Gilbert. Publishers: Kangaroo Press, Box 75, P.O., Kenthurst, NSW 2156.
ISBN 0 86417 415 2. 240 mm x 180 mm, hardcover, 256pp., 1 map, 127 b&w illustrations, 8 pp colour depicting 14 of Rupp's crayon sketches of orchids. Recommended retail price: $49.95.

Part I is Gilbert's biography of Rupp, while Part II is Rupp's memoirs edited by Gilbert and illustrated with many of Rupp's fine line drawings of orchids.

Herman Montague Rucker Rupp, clergyman and botanist, was born at Port Fairy, Victoria, the son of a German-born Anglican clergyman. He was sent to school in 1884 to the Junior Grammar School, Geelong, conducted by his uncle, Alfred Rowcroft. Rupp won a scholarship to Trinity College, University of Melbourne (B.A., 1897), and won further scholarships in natural history and theology.

At both Geelong Grammar and the University of Melbourne, Rupp developed his interests in natural history, particularly in botany. He was ordained priest in 1901, and served until 1939 in many parishes throughout Tasmania and NSW where he travelled widely.

Rupp had began recording his botanical observations and specimens in 1892, and from 1899 made a 'census of the native plants' of his parishes. By 1924, he considered it was time to 'concentrate on the family which had always attracted me most - the orchids' and gave some 5000 other specimens to the University of Melbourne's Botany School. During the next 30 years, Rupp published over 200 papers, chiefly on orchids, including descriptions of four new genera and over seventy new species. He wrote two authoritative books, a *Guide to the Orchids of New South Wales* (1930), and *The Orchids of New South Wales* (1943), reissued with supplement (1969).

In retirement, Rupp lived in Sydney, cultivating native orchids, writing about them, corresponding widely with naturalist pen-friends, and working as honorary curator of orchids at the National Herbarium of New South Wales, to which he presented his own collection of 1500 specimens representing some 470 species.

Rupp was a friendly jovial man, who long retained a youthful appearance and enthusiasm. In the best tradition of the nineteenth-century clergyman-scientist, he was generous with his means, time and knowledge, a tireless investigator, and a fluent correspondent whose letters were spiced with a delightful sense of humour. He wrote that one 'of life's pleasures for me is corresponding with orchidy folks', including R.S. Rogers and W.H. Nichols.

Rupp's detailed memoirs are published for the first time, with a biographical study based upon other sources, more especially his enormous correspondence. Financially supported by the Australian Orchid Foundation, the Royal Botanic Gardens, Sydney, and the author, the work is profusely illustrated and includes a bibliography of Rupp's works.

Noel Grundon

ARTICLES WANTED

Articles for publication in *The Orchadian* are always welcomed. We try to maintain a balance of articles, from those of a scientific nature reporting original research on Australasian native orchids, through naturalist-style reports, observations by hobby growers, and topical reports of happenings in the Australasian orchid community.

Our readers have expressed a desire for articles on the cultivation and culture of our native orchids. A number of such articles appear in society bulletins and newsletters, but are often too narrow or specific in their coverage to appeal to the wide readership catered for by *The Orchadian*. However, such articles are the type so frequently demanded by our readership. With a small amount of expansion to cover more general or wider conditions, many of these articles would be quite suitable for publication in *The Orchadian*.

***Action required*: Think about it, but not so long that enthusiasm is lost. Then write the article and submit it to the Editor or one of the Associate Editors!**

BOOK REVIEW

[Ed. - This review was first published in *The Bulletin of the Native Orchid Society of South Australia Inc.*]

ORCHIDS OF SOUTH AUSTRALIA

By R.J. Bates and J.Z. Weber. Recommended retail price: $29.95. Available from most bookshops, the Adelaide Botanic Garden, and the South Australian Government Printer.

This long awaited book on the South Australian orchids updates the orchid chapter in *Black's Flora.* It is a magnificent book. Although very tired, I stayed up into the small hours to read it all at the first sitting. It concisely represents the current knowledge of South Australian orchids, which are all terrestrials, in one volume.

The book is very useful for identifying South Australian orchids. There is a colour photo, line drawing, and a description of each species, as well as a key for separating species within a genus. Location maps for each orchid (not too detailed with conservation in mind) show at a glance just how widespread is each orchid. Rare plants have only one or two dots to show that they are clinging to life precariously.

I found the written descriptions easy to read. There are habitat descriptions, and cultivation notes for those species where cultivation has been tried. Some have not been cultivated successfully, while others thrive in pots. This type of information is vital for those working in the conservation arena, especially if they live in other states or overseas.

There are explanations of the orchid's annual life cycles, and the mycorrhizal associations between orchids and fungi. These fascinating topics are all part of the orchid story.

A chapter on conservation status is depressing. Have our orchids got a long term future? This book will help their survival through education. It is the culmination of the work of the authors and many other people this century. No one else will do it for us.

Name changes are the orchid lovers nightmare at present as Australia's orchids are sorted out and reclassified by workers in Canberra. Some new names are foreshadowed in the appendix. To keep sane, I tell myself that the orchids know what and who they are. It is only humans who give them names, and then haggle over which name applies to which plant. This book uses pictures and words to describe each orchid. These will not change and neither will the orchids.

To sum up, this is a book for everyone who loves our orchids. The beautiful pictures make it an invaluable field guide. The book has a pink cover with a white and blue sun orchid and purple waxlips on the cover. In the title, the word *ORCHIDS* stands out, but the words *of South Australia* are hard to read.

Orchids of South Australia is available from $29.95, and is worth every penny.

Les Nesbitt

IRA BUTLER TROPHIES AWARDED IN 1991

R. Rudkin
Hon. Secretary I.B.T.C., 18 Lyle Ave., Lindfield NSW 2070.

Our congratulations go to the following people who have been awarded Ira Buttler Trophies for 1991:

Champion Australian Native Orchid Hybrid of 1991: *Caladenia latifolia* x *Caladenia flava* 'Harlequin', owned by Bob Bates.

Winning entries:

Central Coast Group Spring Show: *Dendrobium* Elegant Sunset - Ken Smith.
Port Hacking Group Spring Show: *Dendrobium* Kalang - Col Brandon.
Sydney Group Autumn Show: *Pterostylis X furcillata* - Jim Lykos.
Sydney Group Spring Show: *Dendrobium* Star of Riverdene 'Natasha' - David Butler.
Sydney Group Sarcanthinae Show: *Sarcochilus* Heidi - Ross Sadlier.

Warringah Group Spring Show: *Dendrobium* Golden Dorn - P. and Y. Spence.

Wollongong Spring Show: *Dendrobium* Mini Pearl - Russell Lea.

Native Orchid Society of South Australia: *Caladenia latifolia* x *Caladenia flava* - Bob Bates.

Native Orchid Society of Toowoomba, awarded HCC/AOC-QOS:(*Sarcochilus* Melba x *Sarcochilus* Fitzhart) 'Maree' - Russell Kanowski.

Orchid Society of N.S.W. Winter Show: *Dendrobium* Australia – D. and V. Taylor.

Orchid Society of N.S.W.: *Dendrobium* Tweed 'Big Brother' AM/NSW – Col Brandon.

Orchid Society of South Australia Autumn Show: *Dendrobium* Hilda Poxon - R. and G. Shooter.

Orchid Society of South Australia Winter Show: *Dendrobium* Blushing Sun 'Piccaninny Dawn' - R. and P. Rankin.

Orchid Society of South Australia Spring Show: *Dendrobium* Eureka x *Dendrobium* Sunglow - A. and D. Garner.

Tasmanian Orchid Society Spring Show: *Dendrobium* Aussie Zest 'Grace' - G. and S. Knight.

Orchid Society of Western Australia Spring Show: *Dendrobium* Golden Fleck - I. and M. Duncan.

THE IRA BUTLER TROPHIES FOR 1992: A NEW ELIGIBILITY CATEGORY

R. Rudkin
Hon. Secretary I.B.T.C., 18 Lyle Ave., Lindfield NSW 2070.

There has been a wonderful increase in the popularity of Australian native orchid hybrids right around Australia. Recently, there have been cases of native orchid hybrids becoming the Grand Champion of shows run by societies affiliated with State Orchid Societies. The Ira Butler Trophy Committee has decided to recognise the quality of these plants by introducing a new condition for eligibility for nomination for a Silver Trophy. As from 1992, a nomination can come from any society affiliated with its State Body for a plant that has been Grand Champion of its Spring Show. It is also eligible to be judged for the Champion Australian Native Orchid Hybrid of the Year Trophy.

Just as for Champion Native Orchid Hybrids from A.N.O.S. Group or State Society Shows, and plants awarded an FCC, AM, or HCC by a State Society, it will be necessary to send a nomination form which is obtainable from the State Orchid Society, your A.N.O.S. Group, or the Honorary Secretary of the Ira Butler Trophy Committee.

You will also need to send three slides showing: (a) the whole plant, (b) the front view of a flower, and (c) the side view of a flower, with no embellishments such as rosettes, ribbons, or place cards. The plants should be labelled A, B, or C, and carry the name of the plant, and the name of the owner. Slides must be of good quality since all judging is from the slides you supply. Neither prints nor copyrighted slides are acceptable.

Entries close on 16 November 1992, and late entries will not be considered. Judging is completed within a few days of the closing date, so that trophies can be dispatched in the year in which they were won.

AWARD FOR NATIVE ORCHID SPECIES

The Council of the Australasian Native Orchid Society is considering a new award for Australasian Native Orchid Species. It is hoped that this award will commence in 1992.

It was felt that such an award, of similar prestige to the Ira Butler Memorial Trophy, would encourage the line breeding of superior species plants, and eventually make bush-collected species uncompetitive in shows and exhibitions.

Nominations for the new award will be by a manner similar to that currently used for the Ira Butler Memorial Trophy. A special nomination form will be used, and good quality slides must be submitted.

Readers requiring further information should contact the Hon. Secretary of A.N.O.S. Council, P.O. Box C106, Clarence Street, Sydney NSW 2000.

READERS' FORUM

A.N.O.S. Patron honoured

Dear Editor,

It is time I released the news contained in a letter from Mr Robin Herbert, President, The Royal Horticultural Society, London, and addressed initially to our Patron, Mr G. Hermon Slade, and from which I will quote:

"It gives me great pleasure to write to you on behalf of the Council of the Royal Horticultural Society to invite you to accept the award of a Gold Vietch Memorial Medal. As you know, a very small number of these medals, nowadays struck in silver gilt, are awarded each year to those who have made an outstanding contribution to the advancement and improvement of the science and practice of horticulture.

If, as I hope, you will consent to receive this award, I would very much like to present it to you myself at the Annual General Meeting of the Royal Horticultural Society on Tuesday 18 February 1992, at 2.15 pm, at our Hall in Vincent Square, Westminster."

Hermon has consented to receive the award and will be going to London in early February.

Yours sincerely,

Gerald McCraith
107 Roberts Street, Essendon, Vic 3040.

Comments on *Dendrobium speciosum*

Dear Editor,

As a professional botanist with an interest in the biology of native orchids, I am reluctant to comment on the scientific content of articles in your journal, as I do not wish to discourage the enthusiasm of some members to write articles. However, I believe that the article by Dr P.B. Adams, entitled "Variation, multiple pollinators and breeding systems in *Dendrobium speciosum* Smith: A biological review", contains a number of errors and unsubstantiated comments which require comment. I will address the errors in the areas of pollination and reproductive biology, as I feel that the taxonomic aspects were correctly dealt with in the article by Dr Peter Lavarack in the same issue.

I feel that I am able to comment on these aspects in this article as I have recently completed an M.Sc. on the reproductive and pollination biology of *Dendrobium speciosum*, and have published nine papers on *D. speciosum*, and delivered numerous seminars to universities, research institutes and orchid societies on my work on *D. speciosum.*

For clarity, I will list my criticisms under sections of the article so that your readers can note them.

Breeding systems

The report of "isolated plants" producing seed pods should not be positively identified as self-pollinations. Bees can travel kilometres in their search for food, and the "isolated plants" were grown in the suburbs of Melbourne where other plants of *D. speciosum* could be growing as garden plants and not in collections.

Adams made a correlation between successful self-pollinations and warm temperatures which is not substantiated by any evidence. This conclusion would require evidence as it contradicts previously published results where 1 of 47 self-pollinations were found to be unsuccessful (Slater 1988). To substantiate the correlation made by Adams, results to prove this observation would need to be obtained after completion of an experiment designed to test the effect of temperature on pod setting.

Table 4 of Adams' article shows that no self-pollinations were successful for either *D. speciosum* var. *speciosum* or *D. speciosum* var. *hillii*, yet in the text he contradicts these results by stating that "self-pollinations are usually successful in var. *hillii* and var. *speciosum* under warm but not cold conditions".

Capacity to develop mature seed capsules

Adams (1991) restated a hypothesis he presented in 1989, that *D. speciosum* is unable to support a large number of seed pods. This hypothesis was based on an observation of pod maturity on a single plant. The same result could also be explained by the pods aborting due to water (too much or too little), nutrients (too much or too little), temperature changes, insecticide and pesticide sprays, or a late acting incompatibility response. During my studies I have noticed plants carrying up to 17 pods on a single spike to maturity. Before Adams' hypothesis is accepted, it should be correctly tested.

Observation of pollination

Adams (1991) stated that "no report to date has adequately outlined the complete sequence required for confirmed pollinator status". Slater and Calder (1988) described the pollination of *D. speciosum* in detail, including the reasons the bees were attracted to the flowers, the behaviour of the bees in a flower and on a plant. This report also described the transfer of pollen from one flower to another, and the state of stigmatic receptivity and pollen viability. The later two are essential in any study of reproductive and pollination biology, although neglected by Adams (1990) and Adams and Lawson (1988) in their "criteria for pollinator status". Slater and Calder (1988) confirmed the native bee *Homalictus brisbanensis* to be a pollinator. This article also discussed a number of factors to explain the low pod set in the wild, and proposed that *D. speciosum* could have a number of pollinators due to the variation in size of the bees and the flowers.

Contrary to the statement of Adams (1991) that there is no evidence available for FitzGerald's suggestion that the Dendrobium beetle is a pollinator. Slater and Calder (1988) investigated the suggested past pollinators. This included the Dendrobium beetle proposed by FitzGerald (1891), and hoverflies proposed by Adams and Calder (1982), not bees as indicated in Table 7 of Adams (1991). Slater and Calder (1988) found that the Dendrobium beetle did not transfer pollen, or behave in a way to effect pollination. Hoverflies were also discounted as pollinators in the article, due to their behaviour around flowers.

Adams (1991) reported that *Trigona* bees had been observed carrying up to 4 or 5 pollinia, which would increase the likelihood of pollen deposition at ensuing floral visits. As the behaviour of this bee is not described, carrying a greater number of pollinia seems unlikely to make the bee more effective, as the behaviour of the bees reported by Slater and Calder (1988), as well as the photograph included in the article, indicated that it is only possible for the bee to carry one pollen mass effectively for transfer to the next flower.

Table 7 of Adams (1991) is meant to be according to the criteria proposed by Adams and Lawson (1988) and Adams (1990). In those two articles, no distinction is made between "suggested" and "probable" pollinators, only what is required for "confirmed pollinator status".

Fragrance biochemistry

Although the fragrances identified are associated with the social behaviour of these bees, no evidence is provided that the bees collect fragrance from these flowers. In other systems where the collection of fragrance has been identified, the pollinators will actively collect the fragrance, for example by actively gathering the perfume droplets (Dobson *et al.* 1969). In contrast, Slater and Calder (1988) reported that the bees did not stay in the flowers long enough to collect any substance, and they also reported that the osmophores which produce the fragrance are scattered over the petals and sepals, which would indicate that it would take some time to collect the fragrance.

Discussion

A number of publications are omitted from the discussion in the review, although throughout the article comments appear to originate from some of the uncited articles without stating their original source.

A basic tenet of pollination ecology is that it is far more commonplace for flowers to have a number of pollinators. Even within orchids, it should not be assumed that there is a specific pollinator for any one species until the reason for this specific relationship is confirmed.

Adams (1991) provided an incomplete list of pollinators. The results to date show the complete list of confirmed pollinators for *D. speciosum* to be *Homalictus brisbanensis* (Slater and Calder 1988) and 2 species of *Trigona* (Adams 1991), while suggested pollinators which conform to the behaviour of the pollinators, but did not transfer the pollinia, were 2 species of *Lassioglossum, Trigona carbonaria,* and *Hylaeus disjunctus* (Slater and Calder 1988). Smythe (1970), Jones (1983) and Adams (1991) have suggested species of *Trigona* to be pollinators, while Adams (1991) has also listed the introduced honey bee (*Apis mellifera*) as a pollinator.

Adams (1991) suggested that reward, or lack of it, offered by *D. speciosum* to its pollinators should be reinterpreted. This reinterpretation should only be considered after the pollinators have been identified to be collecting perfume from the flowers. As the behaviour of the pollinators reported previously is not consistent with the collection of any reward from the flower, reassessing the pollination syndrome with the current evidence seems unnecessary.

The statement that self-incompatibility can be overcome by increases in temperature (Adams 1991) is unsubstantiated. Johansen (1990) provided a good deal of evidence on incompatibility in *Dendrobium*, and concluded that auxin triggers the incompatibility response.

The article by Peter Adams has added to the information previously published, where it was proposed but not confirmed that there were multiple pollinators of *D. speciosum* (Slater and Calder 1988). This proposal was put forward because of the variation in the size of flowers and the consistency in the behaviour of the bees on the flowers, an aspect that has been totally neglected by Adams (1991).

The comments I have made in this letter can all be substantiated, and if any reader is interested in obtaining original published material, I would be quite willing to forward the information.

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Yours sincerely,

Tony Slater, B.Sc., M.Sc.
159a Raleigh Street, Thornbury, Vic. 3071.

More on *Dendrobium speciosum*

Dear Editor,

I read with disappointment the article by Dr Peter Adams (*Orchadian* 10 (5): 124-140). Much time and effort has been invested in reviewing information on *Dendrobium speciosum* Smith and its varieties, but achieving little else.

Many of the tables were, to me, inconclusive, being open to alternative interpretation or assuming a result. Much is also attributed to the indeterminate classification, 'extremely variable'.

The widely spread var. *speciosum*, ranging from the Hunter River area in central New South Wales to the Cann River in Victoria, must have had enormous distribution problems prior to the introduction of the European honey-bee.

The use of pollinators as a taxonomic factor fails as none of the varieties are pollinator specific, unless it is var. *capricornicum* or var. *curvicaule*, and if they were, it would really put a bee in the honey-pot.

I wonder at statements like "no basic research on the genetics of *D. speciosum* seems to have been undertaken". Perhaps it should have read 'been published'. On page 138, I read "there is a need for more detailed studies of ... pollinators, ecology, genetics and biochemistry ... However they are unlikely to further clarify taxonomic status".

I found Dr Peter Lavarack's comments concise, precise and far more constructive, particularly his references to DNA investigation, to which should have been added constant enzyme pattern analysis. He does make pointed comment on 'splitters', but fails to satisfactorily deal with 'lumpers'.

There are independent chemical laboratories in Australia with the facilities to undertake allozyme electrophoresis, DNA investigating and DNA fingerprinting. These organisations are neutral in the current debate, and they have no interest in, and are not affected by, the outcome of their findings. My enquires indicate that the cost of a preliminary allozyme analysis would be relatively inexpensive, and would indicate if a more extensive analysis would be needed.

Furthermore, genetic evidence, contrary to Dr Adams' comments, appears to be the most objective means of resolving the conflict. Although most taxonomic studies using DNA analysis concentrate on inter-family rather than inter-specific classifications, the field is expanding rapidly. I am told that investigation facilities for DNA variation between plant species will soon be available.

The latter techniques, combined with allozyme analysis, should resolve the controversy. I propose that instead of inconclusive comments and writings, those efforts be focused towards raising funds, and locating a suitable independent laboratory to carry out the work.

I understand that allozyme electrophoresis was one of the tools used to separate *Cattleya loddigesii* and *Cattleya harrisonii*, and hybridists were placated by the decision that any hybrids with *C. harrisonii* parentage would be classed as being a *C. loddigesii* hybrid.

Yours sincerely,

Reg Angus
55 Campbell Avenue, Dee Why, NSW 2099.

A note on the culture of saprophytic native orchids

Dear Editor,

The article I wrote some time back (Angus, R. 1990. Preliminary trials on the use of enzymes for the culture of Australian native orchids. *Orchadian* 9: 261-262.), must have got someone thinking.

There is a liquid, enzyme-based fertiliser about to be released that does not contain cellulase. It can therefore be utilised in a bark mix, and would also clean up any chemical salts trapped in charcoal and other media.

I am trying to obtain some for trials. By the way, my *Dipodium variegatum* plants have flowered for the sixth year in a row.

Yours sincerely,

Reg Angus
55 Campbell Avenue, Dee Why, NSW 2099.

Australasian Orchids Illustrated

Dear Editor,

Thank you for your valued help over the telephone last week. *The Orchadian* arrived the next day, and after seeing the article *Australasian Orchids Illustrated*, I feel it will be a wonderful success for all concerned.

I think that most artists would agree that they find it hard to get recognition for their work, being caught between general art, and the truly specialist field of painting our fascinating native orchids. So for our art to be portrayed in a publication such as *The Orchadian* (all Australian), we are extremely fortunate.

Yours sincerely,

Louise Saunders
P.O. Box 466, Benalla, Vic. 3672.

Some compliments for *The Orchadian*

Dear Editor,

A few days ago, I received the last issue of *The Orchadian* (Vol. 10, No. 5, Spring 1991). I would like to tell you that the article by Peter B. Adams about the *Dendrobium speciosum* complex is one of the best publications in that area I have ever seen. It would be great if you could try to publish more articles of that quality. I am also very positively surprised about the start of *Australasian Orchids Illustrated*, and I hope that you have enough success with the journal to keep this idea alive as long as possible.

Yours sincerely,

Rudolf Jenny
Moosweg 9, 3112 Allmendingen, Switzerland.

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AUSTRALIAN NATIVE ORCHID HYBRID REGISTRATIONS

(New registrations from lists in *The Orchid Review*, January to March 1992. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review.*)

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Anne's Rainbow	Aussie Angel x *speciosum*	Florafest (I. Klein)
Belinda	Kim x Hilda Poxon	R. & D. Sheen
Benizuru	Berry x *speciosum*	Saeki Nurs. (T. Takai)
Carinya	Star Imp x *speciosum*	R. & D. Sheen
Coral Glow	Coral Sun x Star of Gold	R.E. Harris
Daisy May	Ellen x Hewitt Glow	G. & K. Jackson
Fiesta Blush	Fiesta x Blushing Rose	W. Upton
Glenn Star	Rosella x *speciosum*	A. Peck
Purity	Duke x *falcorostrum*	W. Upton
Tetaem	*aemulum* x *tetragonum*	Florafest (I. Klein)
Tracy Wray	Kingrose x Andrew Persson	S. Wray
Valmai Charm	Kim x *speciosum*	A. Peck
Sarcochilus		
James Woolf	*hartmannii* x Susan	Florafest
Penny Ann	Pinky x *australis*	W. Upton
Wandjina	Mavis x *falcatus*	Florafest (M. Derham)

NATIVE ORCHID RESEARCH

[Ed. - The following abstracts of research undertaken on Australasian native orchids have been prepared from the published literature, and are included here for the benefit of our readers.]

Outcrossing in an Ant Pollinated Clonal Orchid

R. Peakall and S.H. James.
Heredity 62: 161-167. 1989.

Abstract: The orchid *Leporella fimbriata* propagates vegetatively by means of underground tubers that form dense but discrete patches of plants. Electrophoretic analysis revealed the presence of large clones extending up to 16 m^2. Individual clones could constitute an entire patch. Most pollinator movements were within clones. As the orchid is self-compatible this suggested selfing rates as high as 70 per cent. However, the adult population genetic structure did not reflect high levels of selfing. Rather, the fixation index, chi-square tests for conformance to Hardy-Weinberg conditions and gene correlation estimates were consistent with panmictic expectations. It is suggested that some outcrossing mediated by ant pollinators, extensive seed flow anticipated for the minute wind dispersed seeds, and elimination of selfed progeny reduce the effects of selfing.

Patterns of Infection and Endophytes Associated with Western Australian Orchids

R.R. Ramsay, K.W. Dixon, and
K. Sivasithamparam.
Lindleyana 1: 203-214. 1986.

Abstract: *Rhizoctonia*-like fungi associated with 144 species or varieties of terrestrial orchids from the southwest region of Western Australia were studied in terms of the abundance and location of endophyte in host tissues, seasonality of infection, and fire ecology of the endophyte. Five patterns of infection were recognised in mature plants based on the presence of endophytes in roots, underground stems, stem tubers or stem-collars. Mycorrhizal efficacy was determined by screening isolates against seed of the host plant. Germination rates were determined and only isolates associated with good germination were selected for further study. Fungal isolates were distinguishable on the basis of cultural and morphometric characters and nucleation into six categories. These categories appear to relate to existing taxa of Orchidaceae from the southwest of Western Australia. No perfect stages were produced in culture, but an attempt was made to relate fungal categories to *Rhizoctonia*-like fungi with known teleomorphs that have been recorded on Australian terrestrial orchids.

Anastomosis Groups Among *Rhizoctonia*-like Endophytic Fungi in Southwestern Australian *Pterostylis* Species (Orchidaceae)

R.R. Ramsay, K. Sivasithamparam, and
K.W. Dixon.
Lindleyana 2: 161-166. 1987.

Abstract: Attempts were made to develop an anastomosis grouping system for the endophytes isolated from the below-ground structures of the terrestrial orchids of southwestern Australia. Seventy-two isolates from *Pterostylis* spp. were classified into anastomosis groups where ten groups contained more than one isolate and ten isolates failed to anastomose and were reported as unclassified. None of the standard binucleate tester isolates anastomosed with the recognised anastomosis groups of pathogenic forms of *Ceratobasidium*. *Pterostylis* species with isolates from more than three localities were often associated with more than one of the anastomosis groups, but one group usually accounted for more than 50% of the isolates from the host. The anastomosis group P_4 was isolated only from orchids in exotic *Pinus radiata* plantations, suggesting that some endophytic fungi may have specific habitats. Seed germination trials with *Pterostylis vittata* Lindley demonstrated that this species could form a symbiotic association with more than one anastomosis group to induce germination, but in the longer term (> six months), endophytes isolated from the parent species were usually the most effective in maintaining protocorm development.

Pseudocopulation of an Orchid by Male Ants: A Test of Two Hypotheses Accounting for the Rarity of Ant Pollination

R. Peakall, A.J. Beattie, and S.H. James.
Oecologia (Berlin) 73: 522-524. 1987.

Abstract: The orchid *Leporella fimbriata* is pollinated by pseudocopulation with winged males of the ant *Myrmecia urens*. This recently studied interaction provides a unique opportunity to examine the two current hypotheses concerning the apparent rarity of ant pollination systems worldwide. The first hypothesis requires a series of specialised growth forms and floral characteristics regarded as adaptations to ant pollination. *L. fimbriata* does not possess them. The second considers the pollenicidal effects of secretions from the metapleural gland of ants. These glands are absent in *M.urens* males and it may be that the occurrence of ant pollination requires the absence of metapleural glands in the vector.

Chromosome Numbers of Some Australian Terrestrial Orchids

R. Peakall and S.H. James.
Lindleyana 4: 85-88. 1989.

Abstract: Diploid chromosome numbers of Australian terrestrial orchids were found to vary from $2n$=24-56 (35 species, 17 genera). Polyploidy was observed in two species. Chromosomes are typically short, rod-like, and lack distinct centromeres. In contrast the genus *Lyperanthus* has medium to large chromosomes suitable for karyotype assembly. The wide variation in chromosome numbers within Australian terrestrial Orchidaceae suggests that cytoevolutionary phenomena may have played an important role in their diversification.

New Orchid Taxa from South-eastern Queensland

D.L. Jones and M.A. Clements.
Austrobaileya 2: 547-553. 1988.
Abstract: Five new species of Orchidaceae are described from south-eastern Queensland: *Corybas montanus* D. Jones, *Corybas barbarae* D. Jones, *Pterostylis nigricans* D. Jones & M. Clements, *Thelymitra fragrans* D. Jones & M. Clements, and *Caladenia atroclavia* D. Jones & M. Clements.

A New Australian *Corybas* (Orchidaceae) Previously Misinterpreted as *C. diemenicus* (Lindley) H.G. Reichb.

D.L. Jones and M.A. Clements.
Kew Bulletin 43: 135-137. 1988.
Abstract: The name *Corybas diemenicus* (Lindley) H.G. Reichb. has been misapplied to a new taxon which is described here as *C. incurvus* D. Jones & M. Clements.

Reinterpretation of the Genus *Genoplesium* R. Br. (Orchidaceae: Prasophyllinae)

D.L. Jones and M.A. Clements.
Lindleyana 4: 139-145. 1989.
Abstract: *Genoplesium* R. Br. and *Prasophyllum* R. Br. sect. *Bifida* G. Don are here recognised as belonging to a monophyletic assemblage, distinct from the remainder of the genus *Prasophyllum*. As now recognised *Genoplesium* includes species of terrestrial orchids from Australia, New Zealand, and New Caledonia. New combinations are made for all currently recognised taxa.

New Species of *Bulbophyllum* Section *Oxysepalum* (Orchidaceae) in Australia

B. Gray and D.L. Jones.
Austrobaileya 3: 141-148. 1989.
Abstract: *Bulbophyllum grandimesense*, *B. lewisense* and *B. windsorense*, all members of section *Oxysepalum* from north-eastern Queensland, are described as new and their relationships with previously known species of the section are discussed. A key to Australian species in the section *Oxysepalum* is included.

The Pollination Biology of *Dendrobium speciosum* Smith: A Case of False Advertising?

A.T. Slater and D.M. Calder.
Australian Journal of Botany 36: 145-158. 1988.
Abstract: Potential pollinators of *Dendrobium speciosum* are attracted to the plants by large, cream to yellow, finely segmented inflorescences. Plants in natural populations flower synchronously, procuring a massive display. Osmophores scattered over the perianth produce a strong, sweet scent in sunny weather. Nectar-seeking insects are guided to the central, reproductive area of the flower by the colour gradation of the perianth, including an area of high u.v. reflection near the centre, and a bright yellow ridge along the labellum. A tube formed by the labellum and column directs the potential pollinators. The flower, however, produces no nectar.

Flowers vary in size within the six recognised varieties of *D. speciosum* and are pollinated when visited by bees of appropriate size. Post-pollination closure of flowers prevents further access by potential pollinators. The dendrobium beetle and larvae feed on the plant and inflorescences and play no part in pollination.

The low fruit set, characteristic of this species, is considered to be a combined result to self-infertility and the absence of rewards offered by the flower. The specific climatic conditions during which pollinators visit the flowers are also important.

The attraction and pollination mechanisms are similar among all observed varieties of *D. speciosum* as well as some closely related species, possibly explaining the high occurrence of hybrids within this group.

It is concluded that *D. speciosum* provides a visual and olfactory display through the production of a large number of hermaphrodite non-rewarding flowers on each inflorescence, and relies on infrequent outcrosses for successful pollination.

Catalogue of Australian Orchidaceae

M.A. Clements.
Australian Orchid Research 1: 1-160. 1989.
Abstract: The status of all Australian Orchidaceae, including those found in the external territories, has been revised. The work is principally a new assessment of all Australian orchids based on viewing of the types, coupled with knowledge of the taxa in the living state. All taxa

and their synonyms are listed in their reviewed state. Information on the types, their location and the distribution of each taxon is presented here. *Dendrobium cacatua, D. capitisyork, D. dolichophyllum, D. melaleucaphilum, Pterostylis arenicola, P. aspera, P. chaetophora, P. ciliata, P. cobarensis, P. concava, P. insectifera, P. leptochila, P. lingua, P. macrocalymma, P. maxima, P. picta, P. praetermissa, P. procera, P. rosensis, P. sanguinea, P. spathulata, P. taurus, P. tunstallii, Trachoma speciosum,* and *T. stellatum* are described as new. The status of forty-one taxa are changed. These are listed in Appendix 4. The intergeneric hybrid *X Calassodia* is described as new for a natural cross between *Caladenia* and *Glossodia.*

A New Species of *Calochilus* (Orchidaceae) from North-eastern Queensland

David L. Jones and Peter S. Lavarack.
Proceedings of the Royal Society of Queensland 100: 101-103. 1989.
Abstract: *Calochilus psednus* (Orchidaceae), a relative of *C. caeruleus* L.O. Williams, is described for north-eastern Queensland.

The New Guinea Orchid Collections of Rudolf Schlechter in Herbarium Bogoriense

P. Cribb and S. Robbins.
Lindleyana 5: 244-248. 1990.

Abstract: A total of 443 duplicate collections made by Rudolf Schlechter in New Guinea and kept in the Herbarium Bogoriense, Bogor, Java, Indonesia are listed here.

The Mycorrhizal Relationship of Multinucleate Rhizoctonias from Non-Orchids with *Microtis* (Orchidaceae)

M.J. Milligan and P.G. Williams.
New Phytologist 108: 205-209. 1988.
Abstract: Multinucleate rhizoctonias isolated from the roots of non-orchid plants were used in symbiotic germination tests with seed of 18 orchid species from 10 genera. The rhizoctonias only stimulated germination of *Microtis.* Investigation of the natural mycosymbionts of adult *Microtis* failed to yield fungi similar to the original multinucleate rhizoctonias: 27 *Microtis* plants collected at seven sites in the Sydney region yielded 26 binucleate rhizoctonias tentatively identified as *Tulasnella calospora* (Boudier) Juel, and one very slow growing multinucleate rhizoctonia tentatively identified as *Sebacina vermifera* Oberwinkler. Fungi closely resembling the original multinucleate rhizoctonias were isolated by baiting the soil with subterranean clover (*Trifolium subterraneum* L.) plants at three of the seven *Microtis* sites.

A New Species of *Dendrobium* Section *Dendrocoryne* (Orchidaceae) from North-eastern Queensland.

B. Gray and D.L. Jones.
Proceedings of the Royal Society of Queensland 100: 105-107. 1989.
Abstract: *Dendrobium callitrophilum,* from north-eastern Queensland and related to *D. aemulum* R.Br., is described and illustrated.

The Contributions of Orchid Mycorrhizal Fungi to Seed Germination: A Speculative Review

Joseph Arditti, Robert Ernst, Tim Wing Yam, and Charles Glabe.
Lindleyana 5: 249-255. 1990.
[Ed. - No abstract given. Numerous references are made to research on symbiotic germination of Australian terrestrial species.]

Recently Named Australian Orchid Taxa - 1: *Dendrobium*

M.A. Clements and D.L. Jones.
Lindleyana 5: 235-243. 1990.
Abstract: Four recently described species of *Dendrobium* Sw. (Orchidaceae) from Australia are described and illustrated here. This is the first in a series of companion papers to the *Catalogue of Australian Orchidaceae* (Clements, 1989). The purpose of these papers is to discuss and illustrate new taxa formally described in the Catalogue. As a consequence of the research for the Catalogue, accurate information on type specimens of Australian orchids is available for the first time. This, in combination with new investigations of Australian Orchidaceae, has enabled us to identify several new taxa which will be described prior to the publication of the orchid volume of the *Flora of Australia* (due in 1993). These companion

papers follow previous publications dealing with *Cryptostylis* (Jones and Clements, 1987b), *Genoplesium* (Jones and Clements, 1989), and miscellaneous Queensland taxa (Jones and Clements, 1987a, 1988). This paper concerns four new species of *Dendrobium.*

The Recognition of Subspecies in *Dendrobium discolor* Lindley (Orchidaceae)

David J. Little and Paul I. Forster.
Austrobaileya 3: 319-321. 1990.
Abstract: *Dendrobium discolor* has two different labellum shapes which are geographically correlated. No apparent intergradation of this variation in labellum shape has been observed. The northern populations in Australia and those in New Guinea are given subspecific status as *D. discolor* subsp. *incurvata* D. Little & P. Forster.

The Genus *Diplocaulobium* (Reichb.f.) Kranzlin (Orchidaceae) in the Solomon Islands and Bougainville

P.J. Cribb, B.A. Lewis, and M. Dickson.
Lindleyana 6: 27-35. 1991.
Abstract: Seven species of *Diplocaulobium* from the Solomon Islands and Bougainville are recognised. Three new species are described: *D. bicolor, D. magnilabre,* and *D. subintegrum.* A key to the species in the region is presented.

Fine Structure of the Wet, Detached Cell Stigma of the Orchid *Dendrobium speciosum* Sm.

A.T. Slater and D.M. Calder.
Sexual Plant Reproduction 3: 61-69. 1990.
Abstract: The stigmatic surface of the orchid *Dendrobium speciosum* is a cup containing detached cells suspended in a mainly carbohydrate mucilage. The fine structure of the detached cells and their organelles is indicative of secretory cells. The cells contain numerous mitochondria with well-developed cristae, dictyosomes containing extensive cisternae, an extensive network of rough and smooth endoplasmic reticulum and free polysomes throughout. There are many amyloplasts in the vicinity of the nucleus. Vesicles are seen rising from the dictyosomes and endoplasmic reticulum. The plasmalemma is undulating, and vesicles can be seen in its vicinity, giving the typical appearance of a granulocrine secretory system. Cetylpyridinium chloride (CPC) fixation to immobilise acidic carbohydrates detected a highly electron-opaque layer surrounding each cell and globules dispersed through the cell wall. The walls of the detached cells show irregular surface projections which are the remains of pitfields. Biochemical analysis showed that carbohydrates and arabinogalactan proteins are major components of the mucilage.

Encapsulation of *Spathoglottis plicata* Protocorms

Foja Singh.
Lindleyana 6: 61-63. 1991.
Abstract: Protocorms of *Spathoglottis plicata* Bl. (Orchidaceae) were encapsulated in alginate to produce individual beads. The beads could be stored for 180 days at 4 °C without much loss of viability. Among the many encapsulating agents tried, sodium alginate was found to be most ideal due to its solubility and formation of a completely permeable gel with calcium chloride at room temperature. Encapsulated protocorms regenerated complete plantlets on a VW modified medium. All the plants were robust and had good root and shoot growth. The technique of protocorm encapsulation could provide an easy and novel delivery system for orchid propagules.

Recently Named Australian Orchid Taxa - 2: *Thelymitra*

M.A. Clements, D.L. Jones, and B.P.J. Molloy.
Lindleyana 6: 59-60. 1991.
Abstract: A recently described species of *Thelymitra* J. Forster & G. Forster (Orchidaceae) from Australia and New Zealand is detailed here for the first time. [Ed. - The species is *Thelymitra malvina*, previously confused with *T. nuda.*]

A Revision of the Genus *Acianthus* (Orchidaceae) in Papuasia

Paul Kores.
Lindleyana 6: 162-174. 1991.
Abstract: A brief discussion of the taxonomically significant characters for *Acianthus* and a taxonomic revision of the genus within Papuasia (New

Guinea, Bismark Archipelago, and Solomon Islands) are provided. Four species occur in the region: *A. vulcanicus* Schodde and three previously undescribed species, *A. gibbsae* Kores, *A. croftianus* Kores, and *A. variegatus* Kores. Keys to the species, descriptions, illustrations, typification, ecology, and distribution are provided. *Acianthus vulcanicus* is currently known only from Bougainville; *A. croftianus* occurs in the Solomon Islands as well as New Guinea; and the remaining two species, *A. gibbsae* and *A. variegatus*, are found only on the New Guinea mainland.

New Taxa of Australian Orchidaceae

D.L. Jones.
Australian Orchid Research 2: 1-208. 1991.

Abstract: One hundred and eight new species and two natural hybrids of Australian Orchidaceae in the genera *Acianthus* R. Br. (5 species), *Arthrochilus* F. Muell. (6 species), *Caladenia* R. Br. (31 species), *Chiloglottis* R. Br. (11 species), *Corybas* Salisb. (5 species and one natural hybrid), *Dipodium* R. Br. (4 species), *Diuris* Smith (15 species and one natural hybrid), *Gastrodia* R. Br. (5 species), *Genoplesium* (15 species) and *Prasophyllum* R. Br. (11 species) are described here.

[Ed. - The following short reports on research being undertaken on native orchids have been prepared from information provided by Gerald McCraith.]

A Survey of the Bamaga Region of Cape York to Locate and Collect Critical Material of an Unidentified *Taeniophyllum* sp.

Chief Investigator: Bruce Gray.
Financial support provided by the Australian Orchid Foundation.

Background

The species was first located in 1979 by B. Gray while on a CSIRO field collecting trip to Bamaga. Only two sterile plants were collected, one of which subsequently flowered in cultivation proving it to be a new species. Both plants were small and eventually died. Searches for more plants have been made at various times and then with only limited success. One plant was found by the Australian Orchid Foundation Expedition to Bamaga in February of 1986. This large plant was damaged during collection and also died.

In 1988, Bruce Gray received funding from the Australian Orchid Foundation expressly to search for fertile material. This trip was not possible until September 1989, but with the rise in airfares appeared to be in jeopardy. However, the late Rev. Ron Collins of Atherton rescued the situation with the offer of his 4WD vehicle, and the trip was planned for 9-30 September.

Aims and Results

The main aim was to collect fertile material of the undescribed *Taeniophyllum* for identification, drawing and possible type specimen.

Plants were located in two areas: Punsand Bay, with direction from Len Lawler, only two small plants collected in an extensive Epacrid thicket; Wasp Creek, large numbers of plants were located also in an Epacrid thicket and plants were collected for herbarium specimens and for growing on to flowering. Several plants collected on the stems on which they were growing are now doing well in cultivation. These specimens were essential to the work on *Taeniophyllum* being carried out by Bruce Gray and David Jones.

Plants of *Taeniophyllum malianum* were also collected in the Leo Creek area of the McIlwraith Range. A plant collected there by DIP Botanist John Clarkson is thought to be a different taxon, but only limited pickle material exists. A search was also made in the same area for a *Taeniophyllum* sp. thought to be *T. lobatum*, collected by Bruce Gray and David Jones many years earlier. However, this was not successful.

The following species were collected for herbarium specimens and are now housed at the CSIRO Herbarium in Atherton:
Trixspermum congesta, new record for the Bamaga area.
Dendrobium X *superbiens*
Bulbophyllum blumei, flowering
Spathoglottis plicata, sterile from 2 locations
Malaxis fimbriata, sterile
Drymoanthus minutus, sterile, new record for McIlwraith Range.
Dendrobium trilamellatum, fertile, 3 locations
D. carronii, fertile, 2 locations
Oberonia carnosa, sterile

Analytical Studies of the *Dendrobium canaliculatum* Complex

Chief Investigator: P.C. Jobson
Financial support provided by the Australian Orchid Foundation.

Aims and Results

The aims of the project are to clarify the status of the four varieties of *Dendrobium canaliculatum* using a number of analytical techniques, and observing morphological variation. Closely related species, namely *D. carronii, D. johannis* and *D. trilamellatum*, are also included in the study. In 1989, Clements published a checklist of the Orchidaceae in Australia, and here he raised the rank of four of the previously recognised varieties. *D. canaliculatum* var. *nigrescens* became the type variety, *D. canaliculatum* var. *canaliculatum; D. canaliculatum* var. *foeschei* was raised to species level; and the synonym *D. tattonianum* was reinstated. Unfortunately, the notes accompanying the species changes are brief, and do not fully explain the morphological differences used to distinguish the species. The article has already come under some criticism (Banks and Clemesha, 1990).

Work has commenced on the intrapopulational study. Thirty plants were marked out on Crown land at Toomulla Beach (43 km N. of Townsville); unfortunately, during the flowering season, the area experienced a control burn, and all the flowers perished. A number of plants were singed. Vegetative data from 30 plants has partially been entered into the computer. The area is now being monitored to observe the effects of fire on *D. canaliculatum*. A new site was chosen at Leichhardt Creek (35 km N. of Townsville), and fifty plants have been marked. Vegetative measurements have been made on all the plants, but only 10 plants have both floral and vegetative characters measured. During the 1991 flowering season, the remainder of the plants will have their flowers measured. It is also intended to have a secondary population staked out near Stuart Gaol (on the outskirts of Townsville) before the flowering season. Flavonoid analysis and electrophoresis will be carried out on these plants.

A field trip was carried out in September to the Starcke River region. This area is north of Cooktown, near Capes Flattery and Bedford. The trip was very successful and a total of 15 populations (approx. 300 plants) were collected, and brought back to James Cook University. They have been mounted on either coconut husks or *Melaleuca argentea* poles. To date, both media have proven successful with only five plants lost from the 1989 field trip to Cape York. This population had experienced a fire approximately two days prior to collection, and had possibly suffered stress as they are the only population to experience insect attack (cockroaches) in the bush house. Spraying with general purpose insecticide has halted attacks on the remainder of the living collection.

Both *D. canaliculatum* and *D. trilamellatum* were collected in the Starcke River area. *Dendrobium canaliculatum* was restricted to the host plant *Melaleuca viridiflora* with one collection (Starcke River) on *M. acadioides*. However, *D. trilamellatum* was found on a number of hosts, chiefly *M. minutifolia*, but also *Leucopogon capeyorkiensis* and a *Eucalyptus* species with tessellated bark.

In habitats with mixed populations of *M. minutifolia* and *M. viridiflora*, *D. trilamellatum* was always found on *M. minutifolia*, and *D. canaliculatum* on *M. viridiflora*. *Dendrobium canaliculatum* was never observed on *M. minutifolia*, unlike on the Atherton Tablelands where *D. canaliculatum* prefers *M. minutifolia* to *M. viridiflora*. This anomaly warrants further investigation, but is outside the scope of this project.

Plants were collected at the type locality of *D. canaliculatum* var. *pallidum*, but, as no flowers were present, it is necessary to wait until the next flowering season to see if their floral morphology matches the description of the variety. The Cooktown airport proved to be an interesting locality as several floral colour morphs were observed. Not only were the two variety colour morphs, var. *nigrescens* and var. *canaliculatum*, present, but a host of intermediates as well. A similar situation, but with not as many intermediate colour morphs, was observed for the Archer Point (south of Cooktown) population.

Some of the plants had initiated flowering while being transported back to Townsville. Both floral and vegetative measurements were recorded. Floral and vegetative measurements were also carried out on a number of plants already housed in the bushhouse from previous trips.

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CONSERVATION OF NEW ZEALAND ORCHIDS

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INTRODUCTION

New Zealand has a small orchid flora of about 100 species spread over 23 currently accepted genera. In this flora there are very few epiphytes, only eight species representing four genera. On the other hand, the terrestrial element is well represented by about 92 taxa, including five leafless, non-green saprophytes, four in the widespread genus *Gastrodia*.

At least 20 taxa are unnamed or of uncertain status, and several others have been assigned to the wrong genus and probably represent monotypic endemic genera. About 66 taxa are currently believed to be endemic, with the rest shared mainly with Australia. Twenty-two taxa are listed as threatened plants. The names and status of all these orchids are currently being reviewed.

DISTRIBUTION AND PRINCIPAL HABITATS

The native orchids of New Zealand are spread thinly throughout the main islands and offshore and outlying ones from the subtropical Kermadec Islands in the north, where two species occur on Raoul Island, to the subantarctic islands in the south. These southern outlying islands show an interesting relationship with their source area of orchids, namely, the main islands of New Zealand. The Chatham Islands, the largest of the outlying islands, and situated directly in the path of the prevailing westerly winds, support the greatest number of orchids, 26 species, including four epiphytes. The numbers of orchids on the subantarctic islands in the south are in direct proportion to their distance from the South Island, their size, and the availability of suitable habitats. For example, the Auckland Islands have 12 species, while the smaller and more distant Campbell Island has only six. Of the main islands of New Zealand, the warmer North Island contains the largest representation of species.

These native orchids occur in a variety of forest, scrub, grassland, wetland and other habitats from the coast to above the climatic treeline, which in New Zealand ranges from about 1500 m at its maximum down to about 600 m in the south. The alpine zone above this treeline supports at least 15 species, with one ascending to 1700 m. These orchids occupy a range of rock, scrub and herbfield habitats. The forested and former-forested lower altitudinal zones support the largest numbers of orchids. Among the forest types, those of mixed conifer/hardwood composition are the richest in orchids, including most of the epiphytes. Several orchids are confined to a subtype of these forests dominated by Kauri, *Agathis australis*. Beech forests, dominated by *Nothofagus* spp. are less orchid-rich, but nonetheless are important orchid habitats.

Shrublands of mixed species, but especially those dominated by *Leptospermum* and *Kunzea*, are some of our best orchid habitats. Natural or induced tussock grasslands carry an orchid flora of around 28 species, while our diminishing sedge/rush wetlands are the habitats of a small select group of about 11 species.

New Zealand orchids occur under a range of soil and climatic conditions with particular concentrations in the warmer far north, in central and southern North Island, and in the warmer top part of the South Island. Some of these choice sites are on old infertile soils, but others are mantled by much younger ones. A common feature of them all, however, is the low nutrient-supplying power of the parent materials, which gives rise to fungal-rich, infertile, often poorly drained soils. Disturbance of the vegetation on these sites usually leads to an abundance of terrestrial orchids.

Old plantations of exotic pines, especially *Pinus nigra* and *P. ponderosa*, with their rich fungal floras, are amazing habitats for terrestrial orchids, given adequate light conditions and lack of competition from herbs, ferns and shrubs. Up to 30 or 40 species may be found in these plantations in numbers seldom if ever seen in native vegetation.

EXISTING NETWORK OF PROTECTED AREAS

New Zealand's protected area network, administered by the Department of Conservation, now approaches 2,400 individual areas embracing over 5 million hectares or 20% of the total land surface. These areas range in size from pocket-handkerchief relics of "natural" vegetation surrounded by developed farmland, to large national parks and forest parks covering a wide range of altitudes and landscapes in the undeveloped and largely uninhabited hills and mountains. This Crown or State network is expanding, with more candidates for large park or smaller reserve status being promoted. In addition, the Department of Conservation, the sole State agency for protection and conservation advocacy, is responsible for managing other stewardship areas and the subantarctic islands, bringing the total area under its control to 30% of New Zealand's land area.

Another rapidly expanding network of protected areas are the covenants registered by private landholders with the Queensland Elizabeth the Second National Trust. This Trust, established by Statute in 1977, promotes and protects natural landscape features on privately owned and leasehold land by means of an open space covenant, by purchase, or by ownership through gifts. Through its covenants, the National Trust acts as perpetual trustee for features it protects, while the land itself remains in private hands. At present the Trust has registered some 430 covenants, covering about 10,300 hectares of forest, scrub, wetlands and grasslands. There are a further 350 covenants under action embracing an even greater area of about 60,000 hectares, including valuable landscapes and vegetation on Maori-owned land, and whole-of-title high country sheep runs on Crown leasehold.

ORCHID COMPONENT OF PROTECTED AREAS

The orchid component of these protected areas is probably considerable but needs collating. This in itself would be quite a task and probably not achievable in the immediate future. The vegetation and flora of many of these areas are reasonably well known, but few accounts have been published. There are other areas where the flora is less well known. In all cases the orchid flora is probably underestimated as most of the information is based on summer field surveys. The native orchid flora is dominated by deciduous terrestrials which appear above ground throughout the year depending on the species, and at least four visits to each area at different times of the year are essential. In addition, some of our perching orchids are high epiphytes in the tops of tall trees and can easily be missed. One thing is certain, there would hardly be a single protected area that did not support at least one orchid species.

ORCHID COMPONENT OF UNPROTECTED AREAS

The landscape of New Zealand can be split almost three ways: about one third could be classed as "natural", where little or no change has taken place in historical times other than by natural means; about another third has been almost completely transformed by agriculture, horticulture, forestry and urban development; and the remaining one third could be classed as "semi-natural" where habitat disturbance of one kind or another continues to operate. Not surprisingly, these semi-natural landscapes support considerable numbers of orchids and pose a conservation challenge. Many of these areas lie between the highly developed and intensely populated lowlands on the one hand, and the largely non-productive hills and mountains which contain our largest protected natural areas. Apart from remnant tall forests and enclaves of other plant communities, secondary vegetation of shrublands and low forest prevails. There is a tendency to protect the tall forest remnants in these areas and to neglect the important, orchid-rich shrublands and allied communities.

NEW MEASURES FOR HABITAT PROTECTION

New measures for habitat protection have the potential to expand the existing protected area network and bring about a greater representation of important orchid habitats. The government supported Protected Natural Areas Programme is one of the corporate objectives of the Department of Conservation, with the aim of protecting representative examples of New Zealand's ecological diversity on land of all tenure. This programme is effected through survey and identification of areas requiring specific protection and the implementation of appropriate protective measures. Surveys are based on ecological districts which were drawn up by multidisciplinary teams of regional experts. So far most of the effort has gone into survey work, and very little implementation has occurred. There are various political, social and economic reasons for this.

The new Government policy on indigenous forests prevents the future harvesting of native timbers on all land, whether privately- or Crown-owned, except on a sustainable yield basis. This policy includes a $6.75 million per year Trust Fund for the protection of indigenous forests of high ecological value. Although this policy has generated intense debate, especially among private landholders, it will certainly prevent further loss of native forests. This move alone will benefit orchids immediately throughout the country, especially the epiphytes.

Although it now seems somewhat unnecessary, the proposal for a new national park to include discontinuous areas of our special Kauri forest remnants in northern New Zealand is commendable. As already noted, these particular forests are home to a select band of orchid species as well as some of the more common ones.

RARE AND ENDANGERED ORCHIDS

New Zealand is well served by the efforts of individuals and organisations to publicise and protect its endangered plants and animals. There are several readable books on the subject in which orchids feature prominently, and within the Department of Conservation there is an increasing awareness of the conservation needs of endangered orchids. However, while considerable progress has been made in protecting and enhancing our endangered fauna, little of note has been achieved with endangered plants. There is an urgent need to raise the whole profile of plant protection. But it is not easy to arouse public support over a plant compared to a rare parrot or marine mammal.

With so much publicity and attention being given to our endangered fauna and flora these days, the common-place elements often tend to be ignored and overlooked. There is a strong case to redress this imbalance if we wish to protect representative examples of our natural systems.

It is timely also to assess critically the relative merits of conserving endangered endemic orchids as opposed to those few species that continually arrive from Australia and became extinct again, or barely obtain a toe-hold. Most of our endangered orchids belong to the latter category.

MANAGEMENT REQUIREMENTS

For many orchids in existing protected areas, there is little, if any, requirement for intervention management. But the continued presence of others, especially those attuned to habitat disturbance, will depend on our ability to manipulate different habitats and make them more favourable. Such manipulation or intervention management will often be in direct conflict with the retention of other natural values. Many of our native orchids do not lend themselves readily to enrichment programmes, or cultivation in botanic gardens, and habitat retention and management seem to be the most desirable strategies.

It has been said that provided there is sufficient habitat, New Zealand's native orchids can look after themselves. In general I am inclined to agree, especially with respect to those orchids secured within protected areas in our mountains and on our offshore and outlying islands. However, in the one third of New Zealand classed as semi-natural, intervention management will become increasingly more important, especially in those protected wetland and dryland systems now reverting to rank growths of inhospitable gorse, *Hakea* and other exotic shrubs and tall herbs.

FUTURE NEEDS

The description and classification of New Zealand orchids is still far from complete and needs to be addressed. Likewise, we need to know more about the whereabouts of all orchid species, in both protected and unprotected areas. The mapping scheme promoted by the New Zealand Native Orchid Group should go a long way towards meeting this requirement. There is also still much to learn about individual orchids and their lifestyles. We know a little about their pollination and breeding systems, but very little about their ecology and almost nothing about their population dynamics, hardly a sound basis for an informed species conservation strategy. On the other hand, we do know that orchids are favoured by particular habitats. There is a need to identify the key features of these habitats so that sound management practices can be put in place. Habitats and orchids at risk also need to be identified and appropriate protective and management measures taken. The New Zealand Native Orchid Group is addressing these issues in collaboration with the Department of Conservation and the scientific community.

APPOINTMENT OF A.N.O.S. CONSERVATION OFFICER

At the Council meeting of 3 March, 1992, Alan Dash of the Central Coast (NSW) Group, was appointed A.N.O.S. Conservation Officer. His address is:

23 Yeramba Cres.,
TERRIGAL, NSW 2260
(Telephone (043) 84 2907).

Readers having any comments on conservation matters are asked to forward all correspondence to Alan Dash at this address.

AN ATLAS OF ORCHID DISTRIBUTIONS FOR THE ILLAWARRA DISTRICT

S. Popple

An atlas can provide a guide to the species of orchids likely to be encountered within any given area. It can also provide a means of identifying areas which are significant due to the presence of rare species or overall species diversity, and to assist in their preservation.

METHODOLOGY

The technique of surveying broad areas to determine overall species distribution is by no means unique. In Australia several successful projects have been conducted, including birds, eucalypts, and banksias. An integral part of these studies was the use of volunteers who compiled data sheets recording the species present within a given area. The field data sheets were then compiled and a distribution atlas produced.

The major vegetation atlases in Australia have based their methodologies on the use of various lines of latitude and longitude to create grids varying in size from 18 km^2 to 150 km^2. The use of a similar technique to map orchid distribution within the Illawarra District proved to be unsuitable. The main problem with mapping orchid distribution is that some species may only occur in small pockets of less than 0.5 km^2, whilst others may occur over a range of 200 km^2. The other problem is that increased illegal collection of orchids, and the deliberate destruction of orchid habitats can occur if a colony of orchids is too well pinpointed. The need therefore exists to develop a grid size which is fine enough to allow ease of surveying and interpretation of data, and yet large enough to provide sufficient protection by not pinpointing exactly where each species occurs.

The selection of 25 km^2 grids as the base survey unit for the Illawarra district was based on the following requirements:

1. Each 25 km^2 grid is exactly one quarter of the large printed grids on the 1:100,000 map sheets. This meant that a uniform grid size occurred over the study area, and that the grid locations could be easily identified by unskilled operators in the field.
2. The 1:100,000 map sheets were readily available and provided sufficient detailed locational and topographical information to allow each record to be pinpointed. Additionally, the 1:100,000 map proved easy for all participants, many of whom were unskilled at mapping to compile data. Particularly useful was the scale 1 cm = 1 km.
3. The size of each grid provided sufficient detail as to each species distribution, without revealing the precise location of the orchid listed.

Each volunteer was supplied with copies of the relevant map sheets, with the grids to be surveyed clearly identified. When recording a species, each volunteer was requested to indicate the orchids status within each particular grid. The status definitions included only two options: 'rare' being defined as a species having either a relatively large population confined to a small area or small populations widely scattered; and 'common' being defined as a species having a large population with a wide distribution. The accumulated assessments of the status of each species were then used to determine those species which may be vulnerable to future developments.

All sightings were recorded onto field data sheets which detailed grid number, species name, status and habitat. Information was provided to all participants on the major plant communities of the Illawarra District. The main vegetation communities were classified using structural forms and dominant species.

Regular debriefing sessions were held in which group members discussed any problems with species identification or any unusual records. The distribution map for each species was produced by combining all of the grid records for that species with additional information from other sources, for example herbarium records, environmental impact assessments, species lists, and flora lists from various sources. All of these records were then plotted onto individual maps for each species, thus providing a clear indication of the known distribution of each species within the Illawarra District. This information could then be compared with other data such as geology, rainfall and vegetation distribution. Distribution data was compiled only from field surveys or herbarium specimens collected since 1970. Because of the dramatic changes in land use within the district and the recent revisions in orchid taxonomy, it was decided that records prior to 1970 may no longer be accurate.

A total of 20 volunteers participated in the orchid survey, with the majority being members of the Wollongong Native Orchid Society. The number of field records contributed ranged from 3 sightings to 140 sightings. Some participants contributed their entire field records accumulated over the last 20 years for the entire Illawarra District. The time spent in each grid by individual volunteers ranged from records accumulated from 1 day visits over a 10 year period to isolated one off sightings along roadsides. The degree of coverage of each grid was extremely variable with some grids surveyed by all participants, whilst others were only partially surveyed by one participant. The orchids surveyed included all orchids within the Illawarra District including both epiphytic and terrestrial species.

SUMMARY OF SURVEY RESULTS

Total records collected by field survey	781
Total records collected from other sources	253
Number of grids surveyed	119
Number of grids not surveyed	48
Number of grids where no orchids recorded	5
Number of genera recorded	34
Number of species recorded	144
Percent of NSW orchid species occurring within survey area	51%
Percent of Australian orchid species occurring within survey area	23%
Number of species recorded, classed rare or endangered	8

CONCLUSIONS

Two local extinctions were recorded during the survey. *Calanthe triplicata* was recorded from Bellambi near Wollongong in 1883. *Dendrobium gracilicaule* was recorded from the Kiama district in 1911, and it too remains unsighted in recent surveys. Both of these species occurred in subtropical rainforest on the coastal plain, and as these areas were the first cleared for farming, it appears that this is the likely reason for their possible local extinction.

The surveying of a district such as the Illawarra District consisting of some 2600 km^2 is a huge task, and the use of volunteer surveyors who only have a limited amount of spare time to conduct surveys makes the comprehensive coverage of such a large district very difficult. A period of only 11 months was available to conduct surveys, and the results achieved are fairly impressive given the size of the district and the time constraints.

The results have revealed that many orchids are more widely distributed and more common than realised. The types of habitats in which each species occurs was in many cases extended by the findings of this survey. The recolonisation of areas previously devoid of orchids due to the cessation of grazing was also reported from some sites. The contraction of many orchid populations particularly on the coastal plain due mainly to urban development was also recorded.

The large area of land currently contained within the Waterboard Catchment areas requires further detailed surveys to determine the true extent of orchid distribution in the Illawarra District. As a management authority it is the responsibility of the Waterboard to increase its current poor documentation of orchid distribution within its property to ensure the long term preservation of orchid species.

GROWING NEW ZEALAND EPIPHYTIC ORCHIDS FROM SEED: PART A. GERMINATING ORCHIDS IN PETRI DISHES

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INTRODUCTION

This paper describes a technique for culturing large numbers of orchid seedlings in petri dishes. Other papers give the results of a preliminary trial for transferring small (0.2 - 1.5 cm tall) seedlings to a non-sterile environment, and outline some of the cultural requirements for *Dendrobium cunninghamii*, *Earina mucronata* and *Earina autumnalis*.

MEDIA PREPARATION

A brief history of the development of culture media, and directions for media that can be prepared without the use of an analytical balance are given by Stoutemyer and Cooke (1989). Since the method described here requires the injection of water and nutrient solutions into sealed petri dishes, addition of organic matter to the medium is necessary to assist the transfer of moisture throughout it. The organic matter also acts as a pH buffer, and it can absorb plant secretions that otherwise would surround the protocorms. It may also provide a source of growth promoting factors. Pumpkin extract that includes its pulverised seeds at 150 g l^{-1} was used as the organic matter source because it was found to have a growth promoting effect for New Zealand epiphytic orchids.

For this method, the medium, when cool, should have the consistency of cold porridge rather than be firm as described for media in flasks. The softer consistency assists moisture transfer. Agar at 6 g l^{-1} provides this consistency. The culture medium is raised to boiling point, left to cool for thirty minutes, and bottled to within 1 cm of the top of 200-ml plastic medicine bottles. Rain water is also bottled in the same way. Both the medium and the rain water are then simmered in a water bath for one hour and taken out to cool. The screwcap forms an effective seal, and the bottle partly deforms to accommodate the slight decrease in partial pressure. The bottles can be used five or six times before they start to fail.

Stored culture medium has a short shelf life, probably because the available phosphate combines with the organic matter present. Light and MacConaill (1990) recommend that the culture medium should be used within a month of preparation.

Just before use, the culture medium is melted by heating the bottle in boiling water for twenty minutes. It is necessary to occasionally shake the bottle vigorously to break up the lumps.

SOWING METHOD

All operations are conducted in a clean bathroom that has been steamed by running the hot shower. Contaminants in the air coalesce with the droplets and fall to the floor. Protective clothing that includes a scarf, plastic coat, rubber gloves, and clean gumboots are worn. Items required for the procedure are: sterile petri dishes, bottle(s) of sterile water, bottle(s) of melted culture medium, Pasteur pipette with bulb, two 100-ml containers, two plastic trays, 5-litre bucket containing calcium hypochlorite solution, seed disinfecting solution, watch and vial(s) containing the orchid seed.

One 100-ml container is used for dispensing the seed disinfecting solution, and another is used for dispensing the sterile water. One tray is used for supporting the petri dishes, the other holds the rest of the equipment since drops of calcium hypochlorite can corrode the sink bench. The bucket containing the calcium hypochlorite is used for disinfecting the Pasteur pipette, the rubber gloves and a 100-ml container for dispensing the sterile water. The bottle(s) of sterile water can also be dipped into this to wet any dust around the caps. The solution is made up by adding two teaspoons of swimming pool chlorine granules to 5 litres of water.

Vials for the seed disinfecting process should have a screwcap, and be of clear glass or plastic. Stoppers are not as aseptic as a screwcap. Seed disinfecting solutions commonly contain sodium hypochlorite to which is added a very small quantity of detergent. A 1:33 dilution of disinfecting solution is sufficient to surface sterilise all seeds in quantity. Household bleach normally contains 31.5 g l^{-1} of sodium hypochlorite, and so the solution used is close to a 1% concentration. Kawaguchi (1991) recommends a 0.1% concentration for Australian *Dendrobium* species but such a weak concentration inevitably leaves infected seeds in the two or three thousand that are in the vial. A 1% sodium hypochlorite solution does not affect the germination rate of New Zealand *Dendrobium cunninghamii*. However, the situation may be different with our *Earina* species because germination rate using a 1% solution is very poor.

For the sowing procedure, place out nine petri dishes and pour the culture medium into the deepest dishes, replacing each lid quickly after they are half filled. Pipette the seed disinfecting solution into the vial and note the time. The seed should be in the solution for only five to ten minutes. Try the minimum time first at a low concentration using very few seeds, and if all of the dishes become infected, then increase the solution concentration and/or the immersion time to acquire infection-free dishes.

Shake the vial vigorously and bang it in the palm of your hand for two minutes to thoroughly wet every seed. Let the vial stand for three to four minutes so that the seed can either sink or float, and then the solution can be pipetted out. Rinse out the other 100-ml container, and dispense the sterile water from it. Swirl the seed to disperse them in the water, and pipette 1 - 2 ml of the solution over the medium in each dish, lifting the lid slightly.

With practice, it is possible to achieve an 80 - 90% infection-free success rate. However, in some instances, it may be wiser to use a weaker disinfection treatment, and have fewer infection-free dishes.

CULTURE

The dishes are stacked in a clean draught-free room for five days before they are sealed. This allows the lids to clear, the medium to solidify, and a check can be made for infected dishes. Because moisture evaporates out of the dishes over this period, the positive partial pressure keeps out fungi and infections rarely occur over this time. If the dishes are confined in a cabinet over this period, evaporation may not be as great, and diffusion of spores into the dishes may occur. After five days, the dishes are sealed using sellotape 18 mm wide.

Dishes that become infected can be washed and stored since they can be re-used. Disinfect them by a ten minute immersion in hypochlorite, and just before the culture medium is poured, take them out of the solution and shake off the drops. The plastic repels water and the little that remains reacts with the sugar and the organic matter in the medium.

Recommended culture temperatures are 20 - 25 °C, but light levels for germination can depend on the orchid species. Light and MacConaill (1990) mention that many terrestrial orchids require darkness for germination. Following germination, subdued light levels are often used. Avoid direct sunlight as temperatures within the dishes quickly reach lethal levels.

Place a piece of card on the topmost dish to prevent water accumulation on the inside of the lid. Water dripping from the lid will wash spores that settled and dried there as the media cooled.

IRRIGATING PROTOCORMS

Petri dishes sealed with sellotape lose moisture at about 0.7 ml month^{-1} at room temperature. Losses will be slightly higher than this if temperatures are held at 20 - 25 °C. This moisture has to be replaced every two to three months if seedlings are to be obtained. This is done by firstly swabbing an area of the dish lid with hypochlorite, making a small hole by pushing the red hot needle of a syringe through the lid, retracting it to flare out the plastic in the needle, and then reinserting it to inject up to 3 ml of sterile water into the dish. The little hole is then sealed with glue delivered with a toothpick. Use a 20-ml syringe with a 0.9 x 25 mm needle, thicker needles make too large a hole, thinner ones lose their heat too quickly, and longer ones require greater care during reinsertion. Inject the liquid slowly so that it spreads out rather than pools in one place. To minimise the risk of infection, plunge the stock bottle in hypochlorite to wet any dust around the cap and only use half the water in it. Dip the handle of the syringe into the hypochlorite, and rinse it occasionally. Wear rubber gloves. The syringe can be re-used. Re-sterilise it in hypochlorite and rinse it just before use.

When working by an open window to permit combustion gases to escape, infection rate has been consistently around 2%. Since there are likely to be seven or eight injections over a year, a 15% overall loss rate may occur before the seedlings are removed.

This cultural method generates wetting and drying cycles. After six months, nutrients may need to be injected since these will either be depleted, lost as gases or fixed with the organic matter in the medium. Prepare a nutrient solution using commercially available foliar fertiliser that contains the macro-nutrients nitrogen, phosphorus, potassium, calcium, magnesium, and sulphur. Use only 0.5 g l^{-1} as stronger solutions will only make the medium too salty. Ensure that this solution is sterilised.

DISCUSSION

This method for growing orchid seedlings was developed for the purpose of growing large numbers of seedlings for selection purposes. It can do this easily, quickly and relatively cheaply. However, success depends on the seeds being able to withstand the disinfection treatment necessary to ensure that all of the seeds are surface sterilised. For orchids that have delicate seeds, growers will need to weigh the options between varying the seed number per dish, sodium hypochlorite concentration, and the time the seeds remain in contact with the disinfecting solution.

This method immerses most of the seed in the culture medium. Since the medium is shallow, seedlings grow through it. Because light reaches the protocorms sitting on the bottom of the dish seedlings 1.5 cm high can be obtained.

From the way in which the protocorms of *Earina autumnalis* lie in the medium, it seems that their orientation is directly related to the orientation of the seed. Seed lying on its side often produces protocorms that lie on their side. Because of the protocorm's wheel-like shape, it is unlikely that they would grow on the firm flat surface of a sterile medium because there would be little contact between the medium and the protocorm. Immersing this seed in a shallow medium will greatly assist protocorm development.

Some orchids have very slow growth rates. Our New Zealand epiphytic orchid *Earina mucronata* takes three months for its embryo to emerge from the seed capsule. Since the available phosphate in the medium will be gradually fixed by the organic matter over time, nutrient addition for these slow growing orchids may be a requirement if seedlings are to be obtained. The injection technique is likely to assist in their cultivation.

Some orchid protocorms, such as those from *Earina*, are non-photosynthetic. In these species, seed germination and protocorm development are best achieved by pipetting the seed into a very shallow, warm medium so that the seed lies just below the surface. This position maximises sugar transfer into the protocorms, and still allows oxygen exchange to take place. Since green protocorms can create their own sugars and oxygen, they can be grown in a slightly deeper medium. Care has to be taken that the very shallow medium (3 - 4 mm thick) does not dry out, and that they are irrigated before fissuring and shrinkage begins.

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CHARACTERISATION BY STARCH GEL ELECTROPHORESIS OF *PTEROSTYLIS X INGENS* (RUPP) D.JONES, A NATURAL HYBRID BETWEEN *P. NUTANS* R. BR, AND *P. FURCATA* LINDLEY.

I.K. Sharma and D.L. Jones
Australian National Botanic Gardens, GPO Box 1777, Canberra, ACT 2601.

ABSTRACT: Glucose Phosphate Isomerase (GPI), an enzyme system, was used to identify an interspecific hybrid between *Pterostylis nutans* R.Br. and *P. furcata* Lindley, using starch gel as a substrate. Different unique banding patterns for *P. nutans* and *P. furcata* were observed. The interspecific hybrid, *P. X ingens* (Rupp) D. Jones, exhibited a pattern of bands from both the parents. Thus the hybrid genotype can be distinguished from the parental genotypes.

INTRODUCTION

Electrophoresis has been used extensively by plant biologists to identify hybrids between plum and peach (Parfitt *et al.* 1988), *Vitis X Muscadinia* (Chaparro *et al.* 1989), *Pterocarya* sp. X *Juglans regia* (McGranahan *et al.* 1986). It has been used also to study genetic variation in a number of organisms (Rubin and Rasmuson 1973; Santamour and Demuth 1980; Selander and Yang 1971), to determine outcrossing rates (Chamda and Gazit 1984), and for development of chromosomes linkage maps (Weeden and Marx 1984). The purpose of the present investigation was to determine if starch gel electrophoresis could provide enough information to identify a putative natural hybrid between two Australian terrestrial orchids, *Pterostylis nutans* R.Br. and *P. furcata* Lindley.

Pterostylis X ingens (Rupp) D.Jones was originally described as a variety of *P. acuminata* R.Br. (Rupp 1928), and its nomenclature adjusted after its putative hybrid status was recognised (Jones 1976). The general floral morphology of *P. X ingens* and its parents is shown in Fig. 1, and the hybrid is further illustrated by a colour plate on page 197 of *Native Orchids of Australia* (Jones 1988). *P. X ingens* is distributed in New South Wales, Victoria and Tasmania (where it is known from a single locality), but is only common in southern Victoria. It is usually found growing in close proximity to the parents in moist habitats such as along stream banks, around the margins of swamps, and in low lying areas. Although natural hybridisation between *P.nutans* and *P.furcata* is a rare occurrence, the hybrid is vigorous, and is able to survive because it forms large vegetative colonies by clonal reproduction.

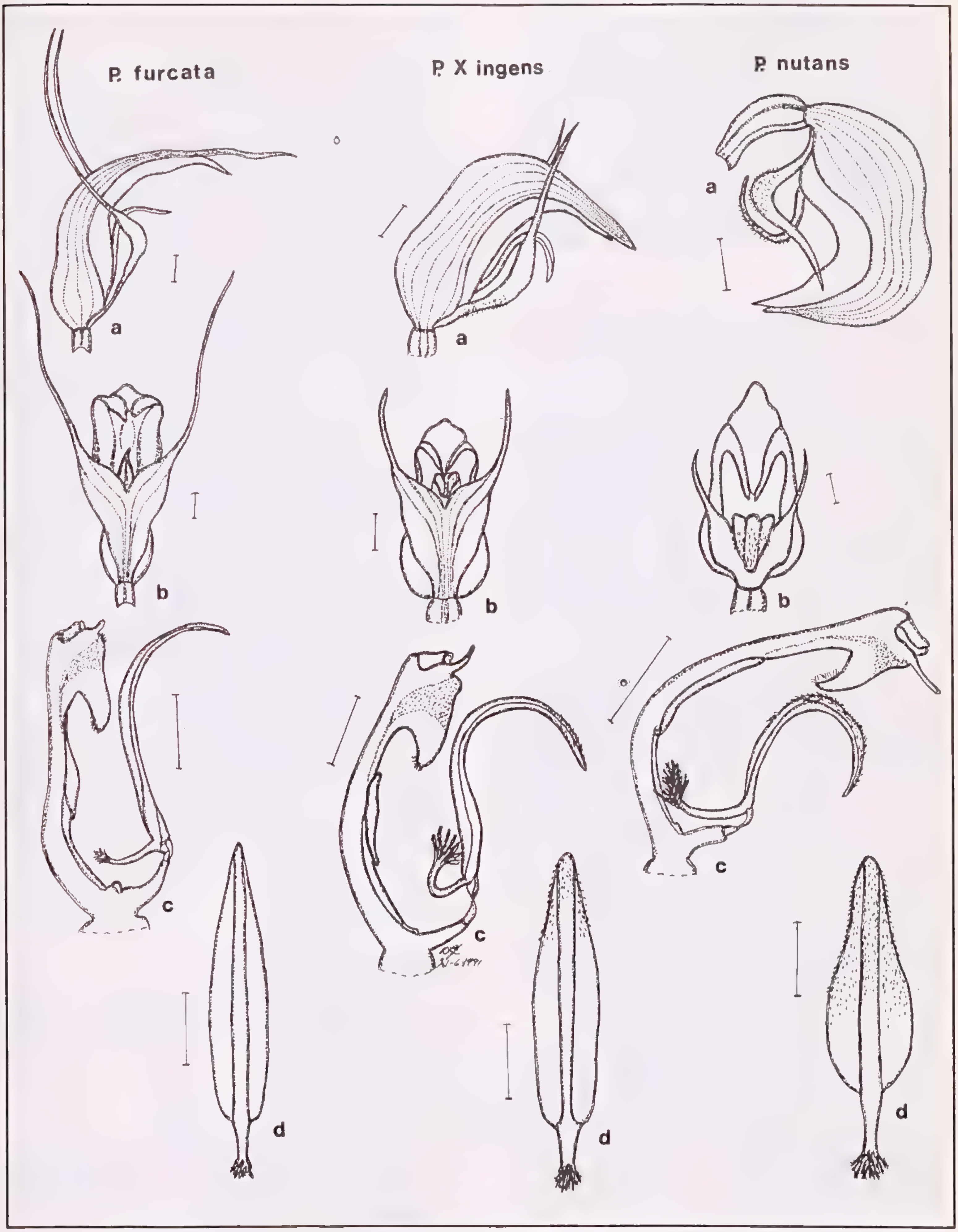

Figure 1. Floral morphology of *Pterostylis furcata*, *P. X ingens*, and *P. nutans*: (a) flower from side; (b) flower from front; (c) column and labellum from side; (d) labellum from above, flattened out. Scale bars = 5 mm.

MATERIALS AND METHODS

Plants of *P.nutans*, *P.furcata* and *P. X ingens* were stored in plastic bags in a refrigerator (2 - 4 °C) until analysed. A small section of a pollinium was mashed in 60 µl of extraction buffer (phosphate buffer pH 6.90, dithiothreitol 1 mg ml^{-1}, Polyvinylpyrrilidone (PVP molecular weight 40,000; 20 mg ml^{-1}), and small pieces of peduncle and leaf tissue were macerated in two drops of the same buffer in 2.5 ml plastic vials. The extract was absorbed onto 5 x 10 mm chromatography paper wicks.

The gel was prepared by dissolving 34 g starch (Sigma S4501) in 100 ml of distilled water. One volume of morpholine citrate buffer, prepared by adjusting 0.04M citric acid to pH 6.1 with N-(3-aminipropyl) morpholine, was diluted to 20 volumes with distilled water, heated to boiling, and rapidly mixed with the starch solution. The resulting solution was degassed under vacuum before being poured into a perspex mould, 215 x 123 x 10 mm. The gel was refrigerated for 30 minutes before the wicks were inserted 5 - 7 cm from the cathodal end. The tray was filled with morpholine citrate buffer, and sponges soaked in tray buffer were used as bridges to the gel. The gel was then run for 4 - 5 hours at an electric current of 60 mA and at a temperature of 3 - 5 °C.

At the end of the run, the gel was trimmed and cut into four 2 mm thick slices. Two slices were used in the present study. A slice of gel was placed in a polystyrene tray, and a staining solution (see below) was poured over the gel.

The staining solution was prepared as follows: *Solution A*: 2 ml of 1M TRIS pH 8.00, 8 ml distilled water, 25 mg fructose-6-phosphate, 1 ml of 10% $MgCl_2$, 0.5 ml NADP (nicotinamide adenine dinucleotide phosphate), 20 µl Glucose-phosphate dehydrogenase, 0.5 ml PMS (phenazine methosulphate), 0.5 ml MTT (3-(4,5-dimethyllthiazol-2-yl)-2,5-diphenyltetrazolium bromide).
Solution B: 8 ml distilled water plus 80 mg Agar.

The agar solution was boiled for a few seconds, allowed to cool to body temperature, and mixed with solution A before being poured over the slices of starch gel. The gel was incubated at 37 °C for 30 minutes until dark bands appeared. The bands were scored, and the gel stored in 50% ethanol for two weeks.

RESULTS AND DISCUSSION

Examples of the banding patterns produced by *P. nutans*, *P. furcata* and *P. X ingens* are shown in Fig. 2. *P. nutans* has a single band which was identical in all plants of *P. nutans* analysed. Thus *P. nutans* was monomorphic for this band. Similarly, a single band was observed in all plants of *P. furcata*, and *P. furcata* was monomorphic for this band. The putative hybrid, *P. X ingens*, showed a combination of the parental types, possessing a fast allele from *P. furcata* and a slow allele from *P. nutans*, with a darker middle band (typical hybrid). The occurrence of a three banded hybrid indicates that the enzyme GPI is dimeric. This enzyme has also been reported to be dimeric in other studies (Arulseker and Bringhurst 1981; Gottlieb 1977).

Confirmation of the genotype of the putative hybrid was also obtained with the pollen isozymes. Both *P. nutans* and *P.furcata* have distinct, single banded monomorphic isozymes, whereas the hybrid, *P. X ingens*, has isozymes from both parents, that is, a slow band from *P. nutans* and a fast band from *P. furcata*, but with no middle band because of the haploid nature of pollen.

To the best of our knowledge, this is the first report of an electrophoretically confirmed interspecific hybrid in Australian Orchidaceae. There have been reports in the literature of hybrids between some species within the family Orchidaceae, but they have not been confirmed electrophoretically. Isozymes have been successfully utilised to identify intergeneric and interspecific hybrids. For example, Wetter (1977) identified intergeneric hybrids between *Nicotiana glauca* and *Glycine max* using isozymes, while Glebe and Hoffman (1978) used isozyme technology to identify hybrids between *Arabidopsis thaliana* and *Brassica campestris.*

These results indicate that the enzyme GPI can be effectively utilised in identifying hybrids in the family Orchidaceae.

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DEFINITION OF "AUSTRALASIAN"

At the A.N.O.S. Advisory Committee Meeting on 17 August 1991, A.N.O.S. Warringah Group suggested that the definition of "Australasian" in the A.N.O.S. Rules be altered to include the islands east of the Wallace Line.

At a recent meeting of the A.N.O.S. Port Hacking Group, this proposal was discussed. The majority of the members in attendance agreed that the A.N.O.S. Rules defining Australasia be altered to a more restricted area from that presently defined. However, there was quite a diverse set of opinions as to the extent of the reduction in area, some even going so far as to result in a change of name for the Society. The A.N.O.S. Port Hacking Group also proposed that, if any changes to the definition of "Australasian" were to be considered, despite the provisions in Rule 23, all A.N.O.S. members should be given an opportunity to vote either by proxy forms mailed to each members or by postal vote.

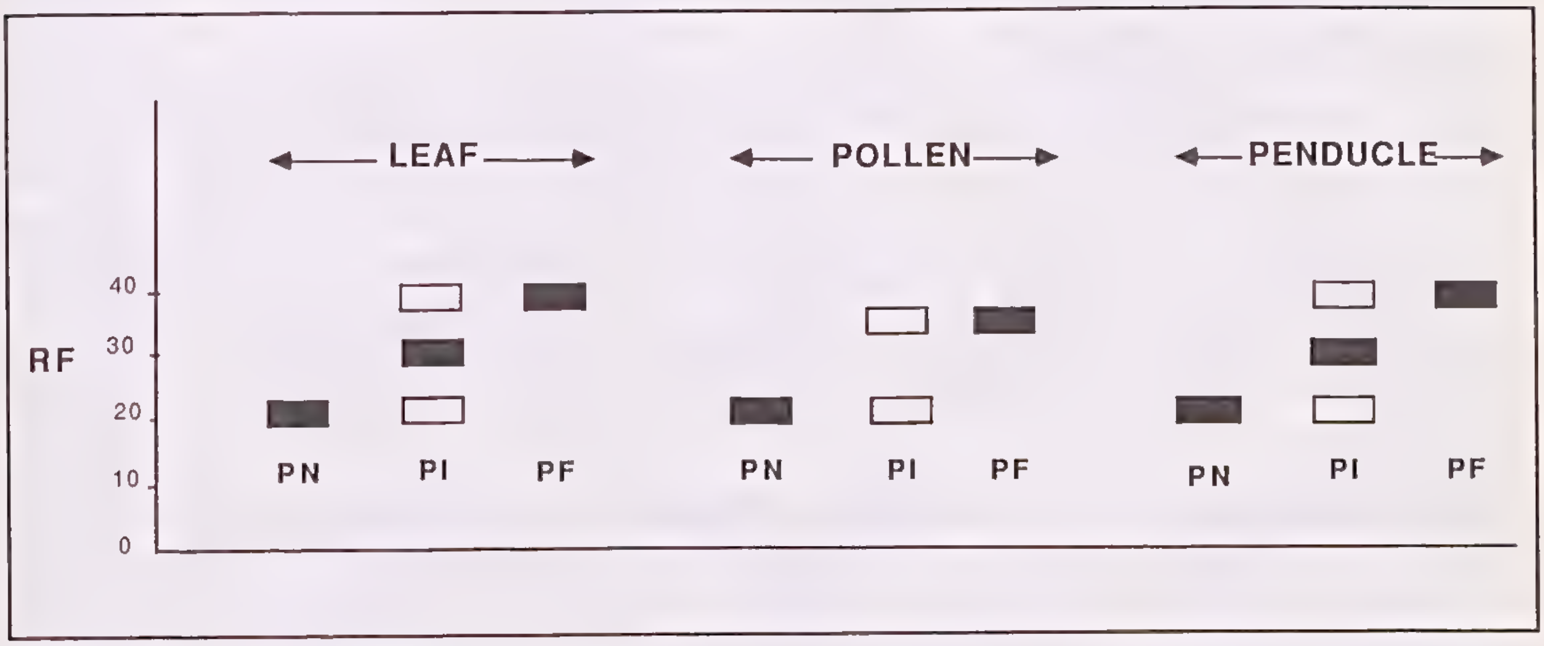

Figure 2. Isozyme banding patterns for glucose phosphate isomerase.
PN = *Pterostylis nutans*; PI = *Pterostylis X ingens*; PF = *Pterostylis furcata*.

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 3: *Diuris fragrantissima* D. Jones & M. Clements

Common Name: Sunshine Diuris

Subfamily: Orchidoideae
Tribe: Diurideae
Subtribe: Diuridinae
Genus: *Diuris* J.E. Smith

Distribution: The genus *Diuris* occurs mainly in Australia with one species found in Timor. *D. fragrantissima* is restricted to the grassy plains north-west of Melbourne.

Notes: All *Diuris* are terrestrial orchids, and are considered to be amongst Australia's most colourful and attractive terrestrial species. *Diuris* flowers are distinguished by filiform lateral sepals and clawed lateral petals, a combination which gives the flowers of this genus their distinctive shape. The flowers are unusual also in that the stamen and style are fused only for a short distance at the base. During floral development, the tip of the pollinia and rostellum fuse to form the pollinarium, the unit transferred by the pollinator. The species *D. fragrantissima* was previously known as *D. punctata* var. *albo-violacea* (Clements 1989). The flowers of this orchid are very attractive, with violet suffusions over a white base, and produce a strong, sweet aroma.

Pollination: There is no recorded pollinator for this species. A few species of *Diuris* are reported to mimic pea flowers and are pollinated by small native bees.

Conservation Status: This species is near extinction in the wild, being restricted to a few naturally occurring plants. Its survival in the wild is threatened by its limited distribution, horticultural collection, urban development, and grazing. In an attempt to re-establish wild populations, it has been planted in grassland reserves.

Culture: Despite being endangered in the wild, this species is quite successful in cultivation. They grow well under 25% shade in a basic terrestrial orchid mix (Richards *et al.* 1988).

Illustration: *Painting;* Illustrated are two flowering plants and three common brown butterflies (*Heteronympha merope merope*) which frequent the area during the flowering season. The plants have a number of flowers on each stem. Note the obvious claws on the lateral petals and the long filiform lateral sepals. *Drawings;* (a) angled front view of a flower showing the petals, sepals, anther, and stigma. (b) front view of the flower showing the stigma, rostellum, pollinia and anther. (c) side view of the column showing the anther, rostellum, style, and a staminode. (d) side view of the column with the staminode removed, showing the partial fusion of the stamen and style, and the fusion of the pollinia with the rostellum.

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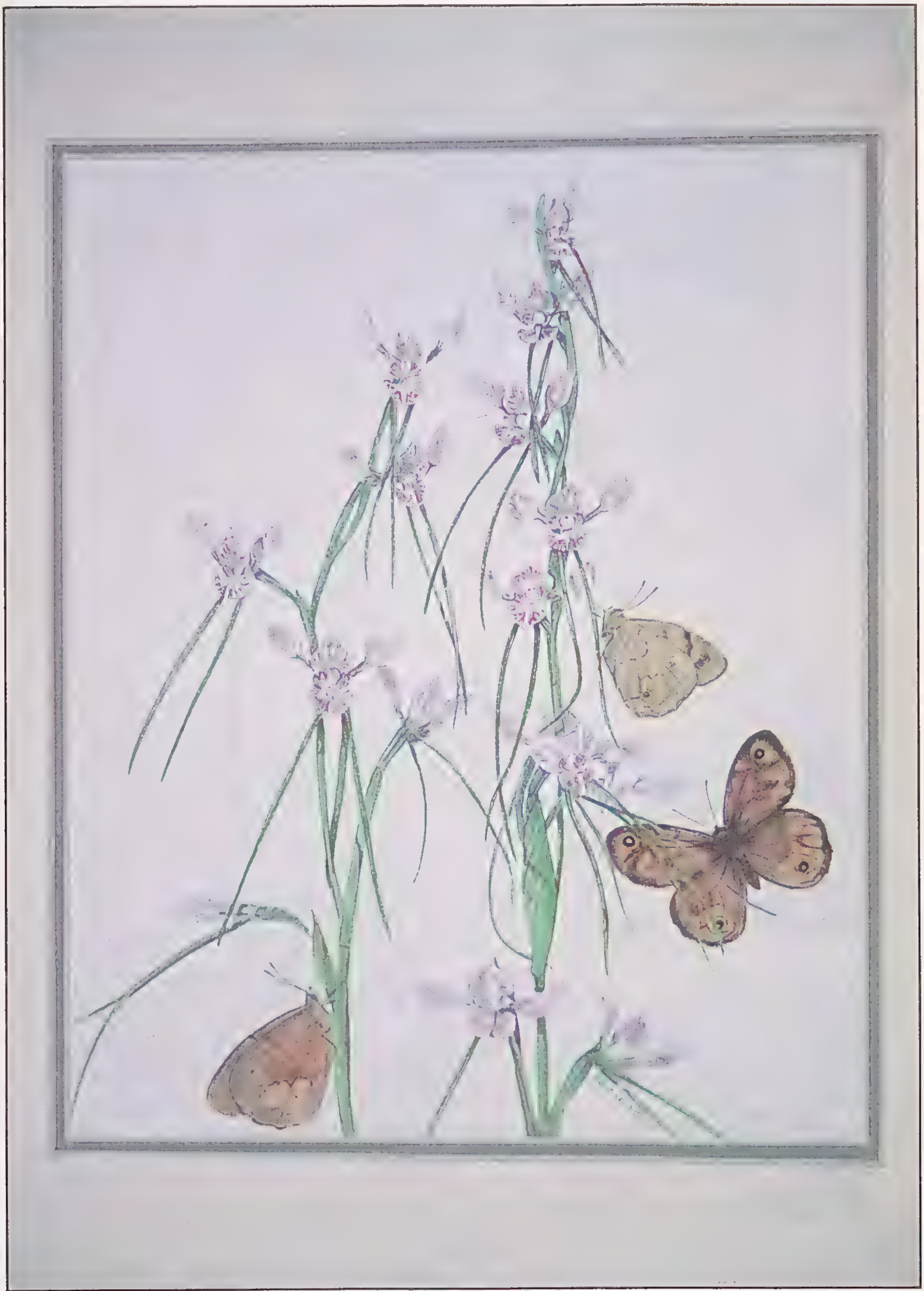
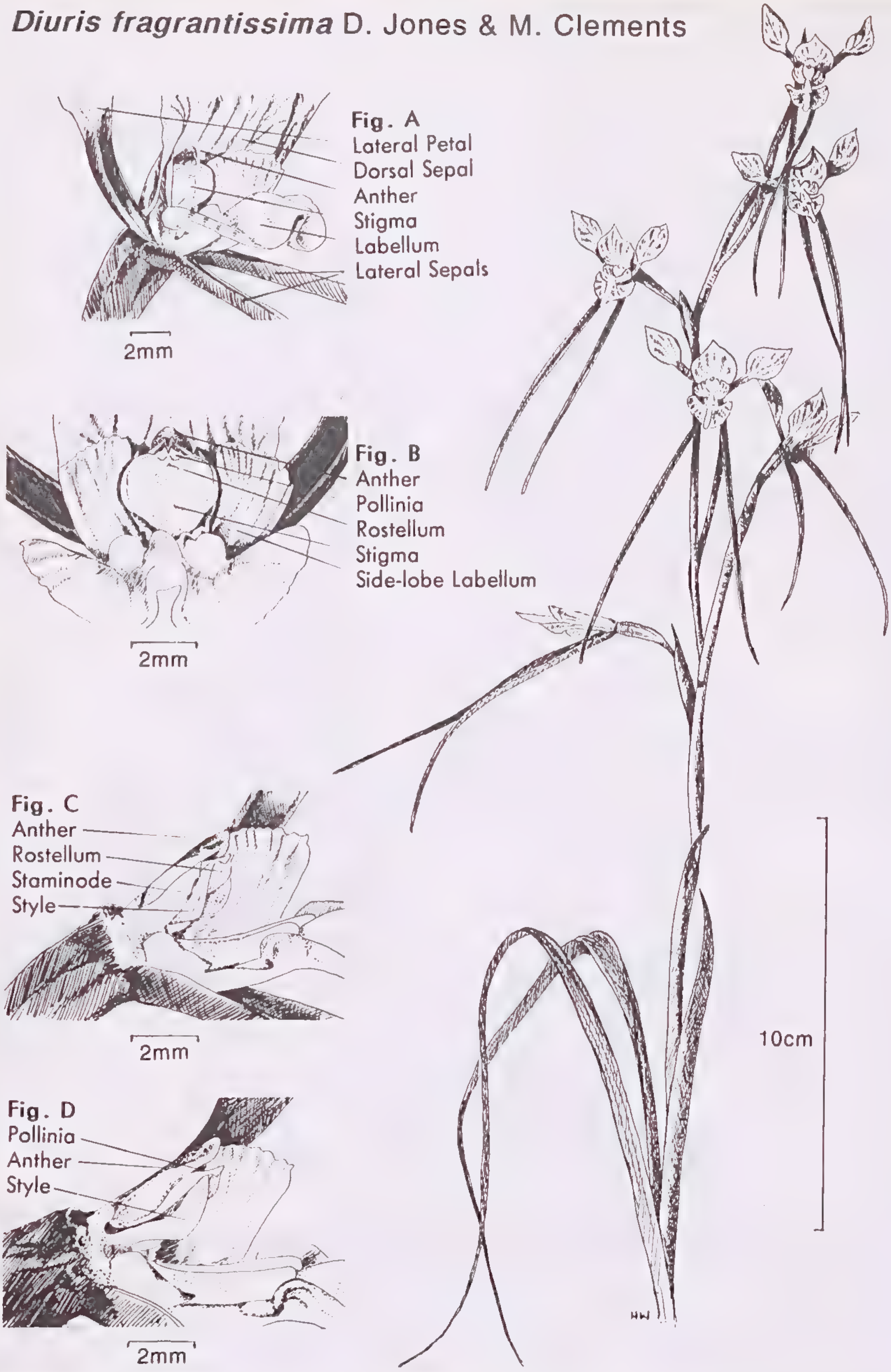
Description: Tony Slater, 159A Raleigh Street, Thornbury, Vic. 3071.
Illustration and drawings: Helene Wild, 56 Civic Parade, Seaholme, Vic. 3018



Diuris fragrantissima D. Jones & M. Clements from a painting by Helene Wild.

Diuris fragrantissima D. Jones & M. Clements



Diuris fragrantissima D. Jones and M. Clements from a line drawing by Helene Wild.

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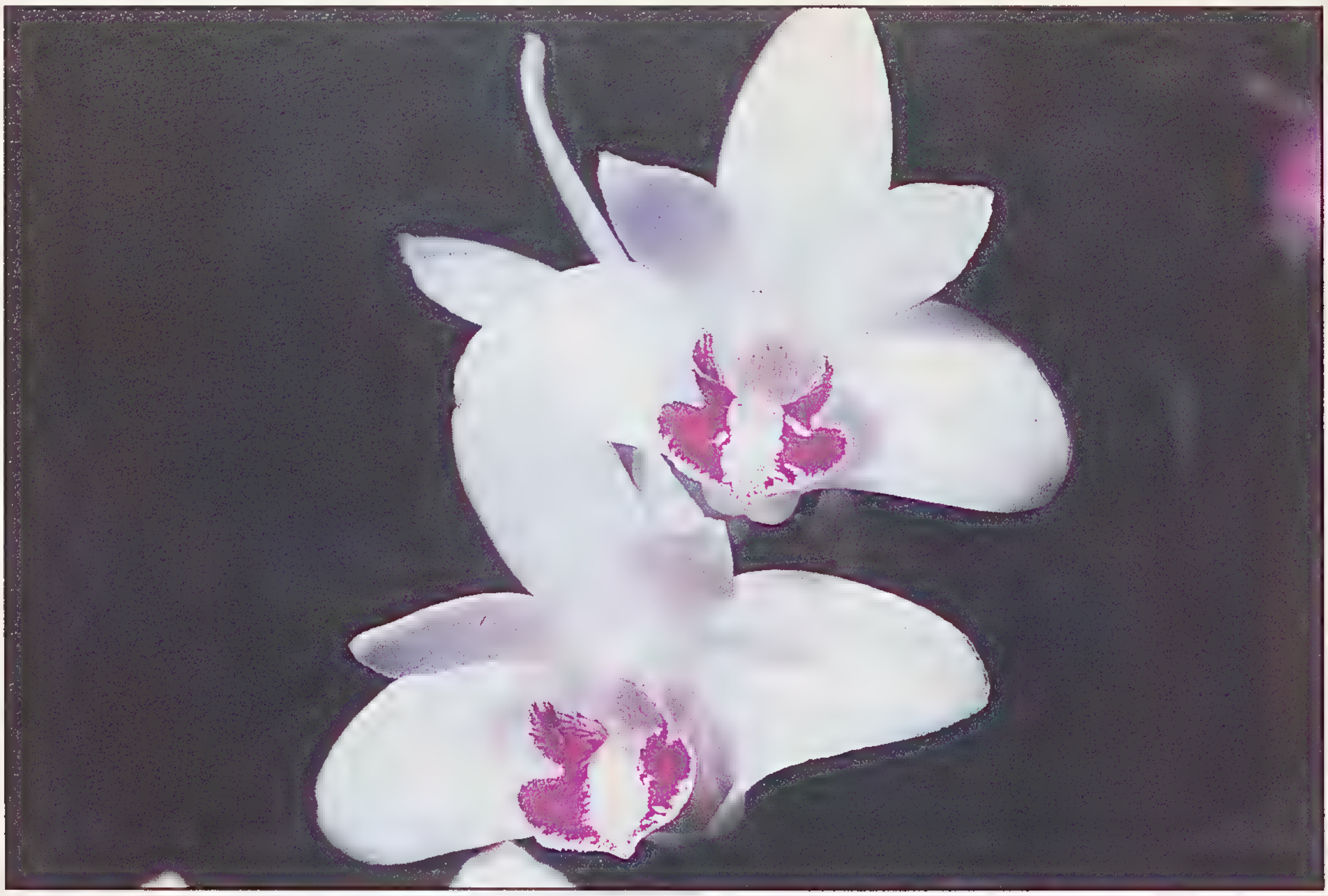
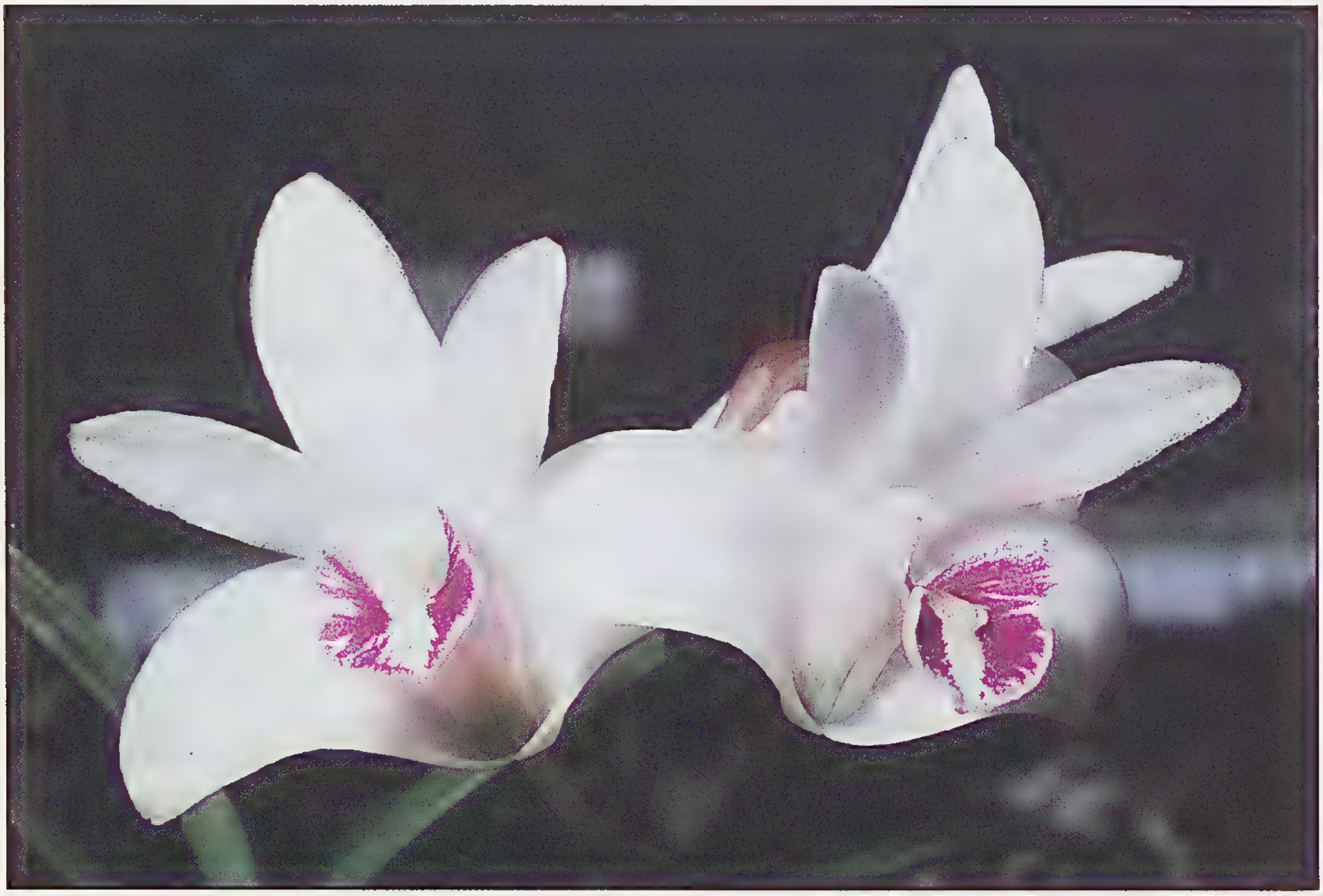


Above: *Dendrobium kingianum* 'Linda'. Photo. Ted Gregory.



Above: *Dendrobium kingianum* 'Sue'. Photo. Ted Gregory.

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TALKING POINT

Dendrobium speciosum revisited

The spring issue of *The Orchadian* (Volume 10, Number 5, pages 124-140) featured a major article on the *Dendrobium speciosum* complex. This article evoked comments from some readers which were published in *Readers' Forum* of the autumn issue (Volume 10, Number 7, pages 236-239). Judging by the articles that appeared in various newsletters, there seems to have been many discussions about *Dendrobium speciosum* amongst members of various A.N.O.S. Groups. I found two articles to be particularly interesting, one by Michael Harrison and another by Gerry Walsh, and have reprinted them in this issue in the interests of the wider readership reached by *The Orchadian.*

In his article, Michael Harrison gives us his thoughts on the flowering behaviour of *Dendrobium speciosum*, and his ideas on how to ensure a good flowering of this species every year.

Gerry Walsh also covers flowering, but deals with the 'new' spotted clones that have taken centre stage recently, and the year-to-year variation in flower colour that is often seen within the one clone. This speculation leads Gerry into comments on the origin of the better forms of *Dendrobium speciosum* var. *speciosum*, and the advantages to be gained by sibling crosses between these better clones, and selfings of the better clones. His final comment is very pertinent in view of the conservation ethic that has been emerging amongst the ranks of native orchid growers in recent years. We have seen much effort to encourage growers to purchase nursery raised seedlings of our species in an attempt to preserve native populations from further collecting. This has worked well with species such as *Dendrobium kingianum* which flower within 2 or 3 years of deflasking. But for species such as *Dendrobium speciosum* which presumably take a long time from deflasking to flower, growers have been less enthusiastic to purchase nursery raised seedlings. However, as Gerry points out ...."... in the never-ending search for the better hybrid, the enlightened growers and hybridisers now realise that improving the species (Ed. - by sibling crosses and selfings of the better clones.) is the best possible course to embark upon." Surely this is also the best possible way to conserve the species in its natural habitat while allowing native orchid devotees to obtain the best possible forms for their own collections.

Noel J Grundon

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THOUGHTS ON *DENDROBIUM SPECIOSUM* SMITH

Michael Harrison
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[Ed. - This article was published first in *The Orchidophile*, in September, 1991, and is reprinted here in the interests of the wider readership of *The Orchadian*.]

An interesting discussion about flowering of *Dendrobium speciosum* took place at the August, 1991, meeting of A.N.O.S. Sydney Group Inc., and this prompted me to put down in writing some thoughts on this matter.

It was noted that the unseasonably mild winter weather during June and the first half of July, 1991, had resulted in the earlier than usual development of inflorescences on many of our native dendrobiums during 1991. A number of growers mentioned *Dendrobium speciosum* in particular as being well advanced, with many clones reportedly already in flower by mid-August. As well as flowering early, it was agreed that this year flower numbers are well up on average, with most plants carrying more inflorescences than is normally the case. However, this increase in flower numbers is being compensated by a general decrease in the size of individual flowers.

Dendrobium speciosum is renowned for its variability in flowering. Flower size is dependant upon overall numbers; the more flowers a plant is carrying, the smaller is each flower. This rule also extends to the inflorescence; the more flowers on an inflorescence, the smaller is each flower, which explains why there are often discrepancies in flower size from one raceme to the next. The logic of this situation is clear. Each plant has limited energy resources to devote to flower production in any given season; hence, flower size is directly proportional to flower number in the sense of expenditure of energy.

The flowering habits of *Dendrobium speciosum* are also variable from year to year. Growers talk about good years, poor years and average years. I have heard it said that some sort of cyclical effect is at work here. The conventional wisdom says that a "good" season for flowering in *D. speciosum* occurs only once in every four years, the routine supposedly being good year, poor year, average year, poor year, good year, etc. Experience has shown me that this simply is not so in any absolute sense: plants flower in response to environmental conditions, in particular prevailing weather conditions, and are limited only by their reserves. Therefore, if consecutive "good" years occur, and plants have the energy resources to flower strongly for two years in a row, then they will do just that, regardless of the good year/poor year theory.

It should be borne in mind that good flowering in *Dendrobium speciosum* is dependant upon suitable weather conditions at the time of initiation of inflorescences, during autumn, rather than at the actual time of flowering, in spring. Of course, weather conditions during the subsequent period of inflorescence development through to the flowers opening are also critical. Over the years I have seen some fine flowerings damaged by excessively cold and/or wet winters, or dull, rainy weather in spring. The point to make is that if conditions are not inductive to good inflorescence initiation, then a good flowering simply cannot occur, regardless of how kind winter and spring may turn out to be.

Certainly, an excellent period for inflorescence initiation occurred for *Dendrobium speciosum* in autumn 1991, and we enjoyed the benefits in spring of that year. I wonder what confluence of conditions was responsible for this? My memories of the 1991 summer and autumn are of long, hot days, with the mercury above 40 °C so often that it just about became the norm. And the weather was so dry for so long that the garden forgot what rain looked like. The lawn eventually expired in the belief that the greenhouse effect had turned East Kurrajong into the Simpson Desert. Apart from a few thundery showers, we had no real rain from the end of August 1990 until May 1991.

Perhaps it was exactly these conditions that resulted in the excellent flowering we enjoyed in 1991. I believe that mature plants in good condition will be stimulated by hot, dry weather into sexual reproduction, and as far as plants are concerned, this means producing flowers. Cooler, wetter seasons are used primarily for vegetative growth, to increase plant bulk and store reserves of food and water in order to support a strong flowering when conditions are right. Of course, *Dendrobium speciosum* always has a bet each way, by producing at least some flowers during cooler, wetter seasons. In certain years, *D. speciosum* will produce just a handful of inflorescences over a whole colony of hundreds of plants, whereas another year, come spring, the same colony will be a spectacular mass of procreative splendour.

If we accept that a warm, dry summer will produce a strong flowering in *Dendrobium speciosum* the following spring, then we must ask why this is so and how such behaviour benefits the species. The object of the exercise is, of course, to perpetuate the species, and that means to produce plenty of viable seed and to have that seed distributed. The final step in the process, after seed production and distribution, is the germination and continued growth of seedlings. This is beyond the control of the parent plant(s), and relies upon the suitability of the location into which the seed falls, and the subsequent weather. But, the thing the parent plant of *D. speciosum* is able to do, is to produce that seed, or at least the majority of the seed, to coincide with a season that will foster good germination and growth. It seems unlikely that *D. speciosum* has the ability to foresee future weather conditions (although I do not discount this possibility entirely), so we must conclude that it simply plays the odds as best it can.

Dendrobium speciosum is usually well in flower by the second week in September, and if flowers are pollinated and fruits develop, then mature seed will be released by mid-December. This generally coincides with seasonal increase in rainfall. In south-eastern Australia, September and October are statistically the driest months of the year, and then rainfall increases through to February and March, the two wettest months. So, seed released during December should have just the right conditions, warm weather with increasing rainfall, to germinate, grow and establish a foothold in its designated situation. However, if a long, hot dry summer occurs, without decent rainfall, then seed will fail to germinate, or developing protocorms will shrivel and dry; either way the attrition rate will be high.

***Dendrobium speciosum* var. *speciosum* 'Little John' HCC/AOC-QOS** is a highly desirable awarded clone owned and grown by Merrellen Orchids. Photo. T. Gregory.

***Dendrobium speciosum* var. *speciosum* 'Dreamtime'** is another highly desirable clone of this popular species, owned and grown by Merrellen Orchids. Photo. T. Gregory.

Such an event would be wasteful and certainly not in the best interests of the species, so *D. speciosum* has evolved to deal with seasonal variability by being variable itself in its flowering habits. A long, hot summer that may damage a crop of developing protocorms, is the trigger for a strong initiation of inflorescences in April/May, which will produce a strong flowering the following September, and which, in turn will culminate in a heavy release of seed in December. More likely than not, that summer will not be as hot and dry as the preceding summer, and conditions will be suitable for seed germination. Conversely, a cooler, wetter summer will not provide the stimulus for plants to produce many inflorescences, because it is more probable that the following season will be a hotter one, and that developing protocorms would be put at risk. Of course, nature gives no guarantees and anything could happen, but *Dendrobium speciosum* plays the odds and takes its opportunities.

The final variable factor in *D. speciosum*, and the one I find most confusing and difficult to rationalise, is flower colour. It has long been recognised that *D. speciosum* varies from year to year in the colour of its flowers, with certain known clones producing yellow, cream, white and even, rarely, red-spotted or blotched flowers in successive years. So often I hear growers saying "last year this was a pure white, but now it's just a cream", or "when I first got this one it was a good yellow, but I've never flowered it like that since", or words to that effect. I know in my own collection that colour can vary from year to year, and unfortunately it seems to be that horticulturally desirable colours (i.e. strong yellows and pure whites) often end up in the cream to light yellow range. However, this is not always the case and every now and then a plant will flower true to my memory of it. In 1991, I had a couple of clones which flowered a better yellow than I have seen them for quite a while, but why this is so, I do not know precisely.

Dendrobium speciosum var. *capricornicum* **'Southern Cross' AM/AOC-QOS** is owned and grown by Southern Cross Orchids. Photo. G. Hellen.

Dendrobium speciosum var. *grandiflorum* **'Kroombit Gold' HCC/AOC-QOS**, another awarded clone that is owned and grown by Merrellen Orchids. Photo. T. Gregory.

Nutrition, or lack of it, probably figures strongly in the equation. I was feeding my plants of *D. speciosum* quite regularly last growing season (once a week with Nitrosol, Fish Emulsion or Aquasol from October to April), and I believe an effective feeding programme is important for such a large-growing, heavy-feeding species as this. I know some growers who literally heap Dynamic Lifter around their plants, and they thrive on this treatment. I cannot say whether such feeding ultimately intensifies the colour of flowers, but it is probably logical to assume good nutrition plays its part.

Another factor which may be relevant is the presence of eucalyptus leaf mulch around the plant. In the bush, *D. speciosum* usually grows on rocks or cliff-faces, very often under gum trees. Leaves and twigs from these trees fall onto and accumulate around and behind the plants, and slowly break down, releasing their nutrients. It may be that some compound which intensifies colour is present there. Or perhaps the fact that *D. speciosum* grows on rock in the bush is significant, in that some mineral component slowly released by weathering is being absorbed and used by the plant.

Apart from nutrition, weather conditions must be considered. So far, the 1991-92 season has seen mostly mild, sunny days and crisp, cool nights, and no significant rain has fallen during late winter/early spring. The only unpleasant aspect of the weather has been the strong westerly winds, which have also brought low levels of humidity, but the plants and developing flowers have shown no ill-effects, except for the occasional blown-over pot. Perhaps plenty of bright, sunny weather results in strong colour, or conversely, plants growing in shady situations may have better colour.

I wonder whether temperature has any bearing. Do warmer than usual maximums or cooler than usual minimums affect colour, or is the maximum/minimum differential a significant factor?

Finally, the thing to remember is that *Dendrobium speciosum* does not flower to impress or please humans. Its reproductive habits have evolved for one purpose, and one purpose only, to perpetuate itself. It takes years for a seedling to reach flowering size; 8 to 10 years in cultivation, and no doubt even longer at times in the bush. Flowering is a big investment for *D. speciosum* and it cannot afford too many mistakes. That it thrives over a large range, and in many places is still a common plant, is testimony to the fact that *D. speciosum* is finely tuned to and is successfully exploiting its environment. It is also one of our most beautiful orchids, but that is just a bonus.

SPECIOSUM SPECULATIONS

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[Ed. - This article was published first in *The Orchidophile*, in December-January, 1992, and is reprinted here in the interests of the wider readership of *The Orchadian.*]

It seems to me that there is something of a revival of interest afoot with regards to good old *Dendrobium speciosum.* Some of you may say that this is hog-wash; that there has never really been a waning in the interest surrounding this very common and probably best-known of Australia's native orchids. But the popular journals of orchidology, including those that deal mostly with imported hybrids, have lately been giving more than a fair share of space to the humble old 'Rock Lily'. There are, in my opinion, three completely different lines of reasoning accounting for this. What can these reasons be, I hear you cry ... in your ceaseless search for truth, and for wisdom, and for inner peace?

First and foremost, we can heap a good deal of the blame on the shoulders of our botanists and scientists. Their factional, and at times individual, inter-

***Dendrobium speciosum* var. *pedunculatum* 'Herberton'** is owned and grown by Merrellen Orchids. Photo. T. Gregory.

pretations of the recipe book of botanical practice and protocol, has really thrown a spanner at the previously accepted order of things. I do not profess to have enough scientific understanding to add weight to any of the recently published arguments on *D. speciosum* and its varieties, or sub-species, or whatever.

But I will say that I felt entirely comfortable with the long-standing practice of giving the types of *D. speciosum* the status of "variety". My personal preference, quite naturally, should have no bearing whatsoever on what the professional botanists eventually decide to do. So, you guys, do not start trembling in your boots or losing any sleep over concern for my feelings in all this; just carry on as you see fit. While ever I have got a few good clones in my bush-house, the speciosum battle does not ruffle my feathers one bit ... so let the war drums beat.

On top of all this botanical drama, which really does make *Dynasty* and *Dallas* seem like re-runs of *I Love Lucy*, the orchid tabloids have recently been sprouting forth with features on new colour combinations for *D. speciosum*. Not all native enthusiasts believe this is necessarily an advancement however.

About twelve years ago a clone of *D. speciosum* var. *speciosum* sporting reddish spots on its sepals and petals, was collected at Mangrove Creek when they cleared that area for the Mangrove Creek Dam. This started a few native growers gooing like babes, but because the other floral qualities of the clone were mostly a judge's nightmare, the masses remained quite underwhelmed.

Then, after a seven or eight year span, a few more spotted clones barnstormed onto the scene. Sid Batchelor had one of his gracing the cover of the *Australian Orchid Review*. This was a much better clone than the Mangrove Creek one and it happened to be a *D. speciosum* var. *curvicaule* from North Queensland to boot. We next read of a consortium of growers from northern New South Wales who have three or four such clones - again *D. speciosum* var. *curvicaule*. These gents are apparently raising siblings of these clones and intend to make them commercially accessible.

Next thing we know, David Banks announces that he has just flowered another two clones of the spotted kind. These were collected years ago as unflowered seedlings from the lower Hawkesbury district. It now looks as if David is fostering his own version of the bubonic plague – the spots epidemic has spread to one of his clones of

***Dendrobium speciosum* var. *speciosum* 'Windermere'** is a very desirable clone owned and grown by M. & N. Finch. Photo: N. Finch.

***Dendrobium speciosum* var. *speciosum* 'National White' HCC/AOC-OSNSW** is owned, grown and photographed by Col Brandon.

D. speciosum var. *pedunculatum*.

If these spotted/blotched types can be made to procreate themselves and still manage to look respectable alongside normal-coloured speciosums in respect to shape and habit, we may open up a huge new field of hybrids. No doubt we would see a lot of remakes of the older style of hybrids ... and why not?

So far I have dealt with the recent technical afflictions swamping *D. speciosum*, as well as the bizarre horticultural occurrence of spotted freaks, for freaks are all they are. But has there been any new development in the old-style, traditional *D. speciosum*?

The broad answer is yes. Of course, with a species such as *D. speciosum*, any development has to be slow. With only one exception that springs to mind, all the really top clones of *D. speciosum* originated from wild sources. The exception is a selfing of the well-known *D. speciosum* var. *speciosum* 'National White' HCC/OSNSW. At the recent Port Hacking Group's Spring Show, there was a superb specimen of this selfing that was superior in every way to the wild-collected division sitting next to it.

This demonstrates perfectly the value of doing sibling crosses, even if you have to wait a decade or so to see if the effort was worth it. A few growers I can think of waited 15 years or more for their selfings of *D. speciosum* var. *speciosum* 'National White' to bloom, and promptly got rid of them. They had small, creamy flowers typical of any old plant that you would not look sideways at in the bush. But some did turn out very good, so give them a chance.

There are a lot of seedlings of a selfing of *D. speciosum* 'Windermere' around the village of Sydney, and a fair percentage of these must turn out to be top notch. I have not heard of any of them flowering as yet, or any other well-known clones either for that matter. There must be more than a few of the earliest sibling crosses approaching maturity by now, so the next few years should turn up a good one or three. Every grower should have a dozen good siblings at all stages from seedlings up to flowering size, in their bush-houses. You may be the one to hit the jackpot in a big way. Most of us would love to put our names on "the best" of some species or hybrid before we all topple off our perches and join up with Orpheus in the underworld.

Dendrobium speciosum is very nearly the only species used extensively in hybridising that has not as yet been improved by line breeding. We are still using wild collected clones as parents. *Dendrobium falcorostrum* is pretty much in the same boat. In the past few years, we have seen advances in the line breeding of *D. kingianum*, *D. tetragonum*, *Sarcochilus hartmannii* and *S. ceciliae* that can only be described as incredible. We have now reached the stage where the hobbyist can go into a nursery and buy a seedling of each of these four species that can be virtually guaranteed to turn out superior to anything still growing in the wild condition. This is a proven fact, and the ultimate in the conservation of species.

Dendrobium speciosum is about to join this select group as well. There are a lot of sibling crosses of it in flask right now, and in the next few years they should be freely available. These have all been made using only the top one or two percent of the clones in cultivation. All of these parents originated in the wild, and it seems appropriate that a few words be written about wild clones at this point.

Nearly all my bush tripping these days is done in September - the sole purpose being to search out superior forms of *D. speciosum*. This particularly applies to the past four years. In this time I have gone as far afield as Wyong, and down as far as Batemans Bay, and nearly everywhere in between. I have seen many thousands of plants in flower. But I have only seen about thirty plants worth collecting divisions from in that time. That is an average of about one plant in about every hundred seen in flower. When it comes to *D.speciosum*, you must be extremely selective.

Some time ago, I was sitting on a rock in the bush with Mike Harrison. I think we had been discussing knitting patterns or something, which, of course led to an in-depth dissection of *D. speciosum*. We each nominated our top five clones. Out of ten possibilities, we came up with seven clonal names. It turned out that three of the seven originated from within half a kilometre of each other on my old family farm in Kangaroo Valley. The beauty of it all is that these three clones are still represented in the wild by big healthy clumps - they have not all been ripped out!

Before you start planning trips down that way, I should mention that, just like anywhere else, the vast majority are only very average, garden variety 'Rock Lilies'.

One reason I am against making the varieties of *D. speciosum* into species in their own right is quite simple. If you cross a *D. speciosum* var. *grandiflorum* with *D. speciosum* var. *pedunculat-*

um, or *D. speciosum* var. *capricornicum*, or whatever, you would effectively be making hybrids, not species siblings. Varietal crosses such as these are currently in flask. By the time these flower who knows what we'll be calling them? Whatever they end up, there are more than a few growers about the place who are looking back at *D. speciosum* and deciding that siblings are the way to go. In the past, the great length of time between flasking and flowering turned many away. But in the never-ending search for the better hybrid, the enlightened growers and hybridisers now realise that improving the species is the best possible course to embark upon.

TWO MEMBERS OF *DENDROBIUM* SECTION *RHOPALANTHE* AND *APORUM*

Peter O'Byrne
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[Ed. - This article has been reprinted from *The Orchid Society of Papua New Guinea News*, June 1991, pp. 11-15.]

The enormous genus *Dendrobium* is divided up into sections to make classification and identification easier. All the members of each section are supposed to have easily identifiable characteristics that distinguish them from other sections. The system breaks down in Papua New Guinea when it comes to sections *Aporum* and *Rhopalanthe*.

Most readers will be familiar with the Philippines species *D. crumentatum* Schwartz, commonly grown in Port Moresby gardens and known as pigeon orchid. This is a typical *Rhopalanthe*. It has long wiry stems with 2 or 3 distinctly swollen internodes at the stem base. The flowers are formed on a leafless extension of the stem and are ephemeral (i.e. last only one day). We are all familiar with the pigeon orchid's habit of communal flowering; a heavy rainfall triggers a "clock" mechanism in all the plants in the area. They then form large numbers of flower buds which all open on the 9th day after the rain. This habit is also typical of many species in section *Rhopalanthe*.

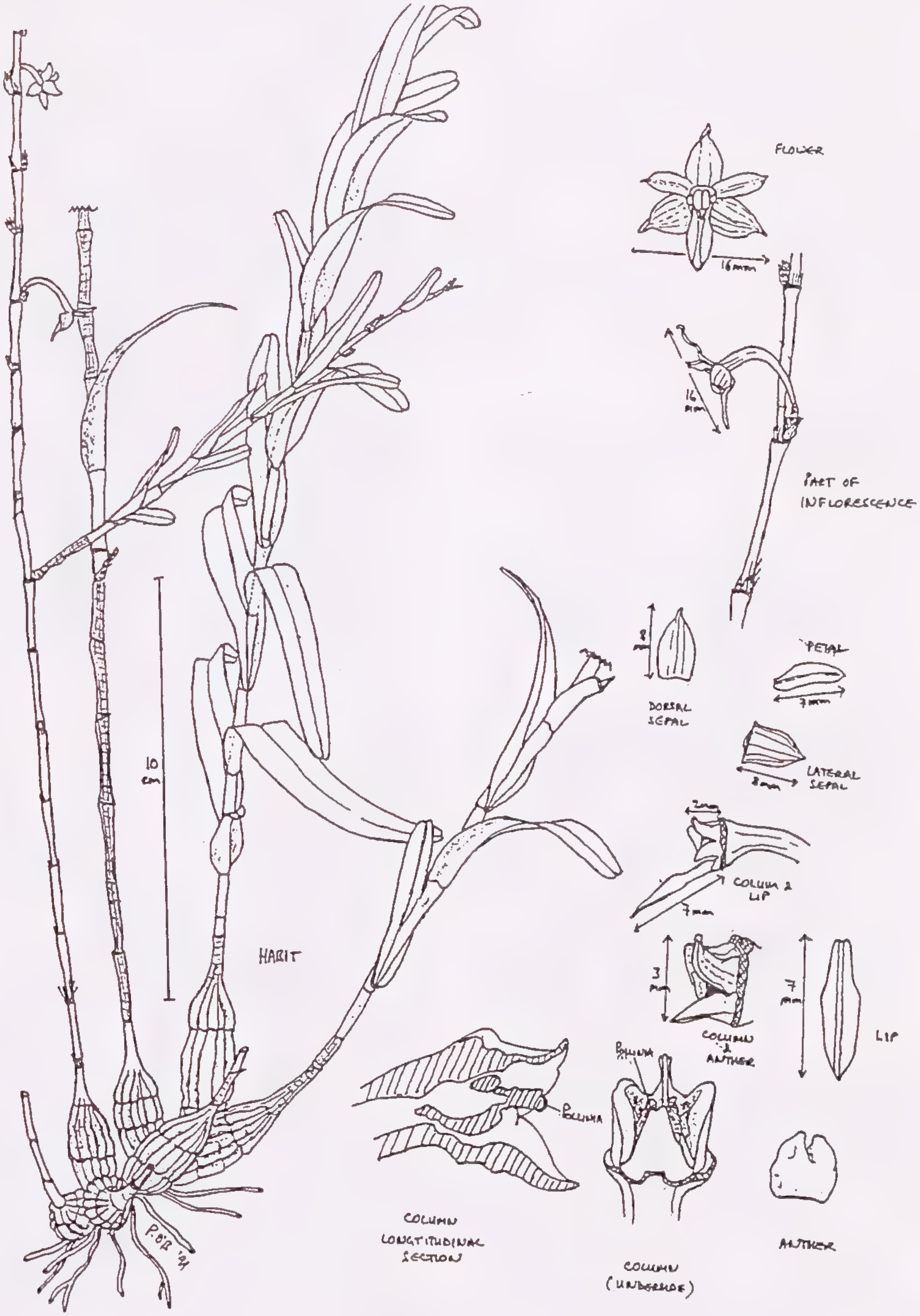
Papua New Guinea, as the slogans continuously inform us, is the land of the unexpected. The early botanists and explorers were surprised to find that none of the Papua New Guinea species in section *Rhopalanthe* are typical. Although they do have the swollen stem-bases of this section, the flowers are not ephemeral, and the plants do not show communal flowering. They are, to all intents and purposes, identical to plants in the section, *Aporum*, the only difference being that *Aporum* lacks the swollen stem-bases. In other parts of the world, section *Aporum* is quite distinct, and the plants are usually similar to *D. aloifolium*. However, in Papua New Guinea, the distinctions between the two sections break down completely. Schlechter sensibly suggested that these taxa needed revision, and that a new section ought to be created to accommodate the Papua New Guinea plants. Unfortunately he died without doing so, and no-one since has tried to sort out the taxonomic relationships.

In this article, I describe a 'typical' *Rhopalanthe*, the first 'typical' member of this section to be found in Papua New Guinea. However, this is still Papua New Guinea, and the new species has some features that make it quite different from the Pigeon orchids in your garden. The second orchid species described in this article is from section *Aporum* as found in Papua New Guinea; the flowers look just like your Pigeon orchids but the stem-bases are not swollen and the leaves are flattened and succulent.

Dendrobium new species
Section: *Rhopalanthe*

Distribution: Known from Oro Province (near Kokoda at 373 m) and Morobe Province (Waria River about 400 m).

This unusual epiphytic species grows on the branches of large isolated trees in farmland, or in exposed situations such as overhanging rivers. It forms clusters of short green club-shaped pseudobulbs which taper into long cane-like leafy stems that sometimes form side-branches and turn bright yellow after the leaves and sheaths have fallen. The lowest part of the thin leaves are pressed over the stem, the upper part then curves away



***Dendrobium* new species (D543)** from a drawing by P. O'Byrne.

from the stem. The leaves on the upper stem are small and fall off, leaving a bare section of stem on which a bundle of dry brown bracts remain at each node. Several flowers are produced from the nodes on the bare stems over a period of several months, usually 10 days after a heavy rainfall. The self-pollinating flowers open for only one day and close at dusk. They are white with pale-yellow tipped sepals. Flowering recorded Jan to May.

Cultivation: Culture is generally as for hybrid dendrobiums. Use pots with plenty of drainage holes with standard orchid mixture or charcoal and brick with some coconut fibre added. This species prefers bright but scattered light, daily watering and high humidity.

Description:
Roots: Many, arising from the rhizome, <15 cm x 2 mm, smooth, white, wiry, branching to forming a mat under the plant.

Rhizome: Creeping, obscured by pseudobulbs, 4 mm diameter, cylindrical, pale brown, bract-covered, pseudobulbs alternating at about 10 mm apart, forming a tight cluster.

Pseudobulbs/Stem: 15 - 60 cm long, in 2 distinct parts, lower 2 - 3 nodes swollen to form leafless pseudobulbs, remainder a thin cane-like wiry sometimes branching stem. Pseudobulbs sub-erect, 20-45 mm, clavate, green, shallowly to deeply multi-channelled, papery white-sheathed when young. Stem erect, 12 - 56 cm x 1.5 - 4 mm (branches thinner), slightly compressed, yellow or yellow-green with black nodal ring. Nodes 16 - 26 mm apart, size decreasing towards stem apex. Leafy throughout, pale-green to light-brown sheaths persist only briefly after leaves fall.

Leaves: Distichous, size decreasing towards stem apex. Sheaths clasping stem, shorter than node, compressed tubular. Blade linear to narrowly ovate, largest leaves <76 x 14 mm, lower quarter pressed around stem, then gradually curving outwards, green, thin, leathery, gradually tapering to retuse unequally bilobed apex.

Inflorescence: Numerous, lateral, one per node on wiry upper stem, flowering in succession, one to a few single flowers produced at a time from each 3 -7 mm erect multiple bundle of dry light-brown chaffy bracts that are pressed against the stem. Peduncle not distinguishable, obscured by 2 - 3 papery bracts firmly attached around base of peduncle-pedicel. Peduncle-pedicel-ovary about 20 mm, green, cylindrical, decurving >90°. Ovary cylindrical, about 6 mm, obscurely 6-channelled.

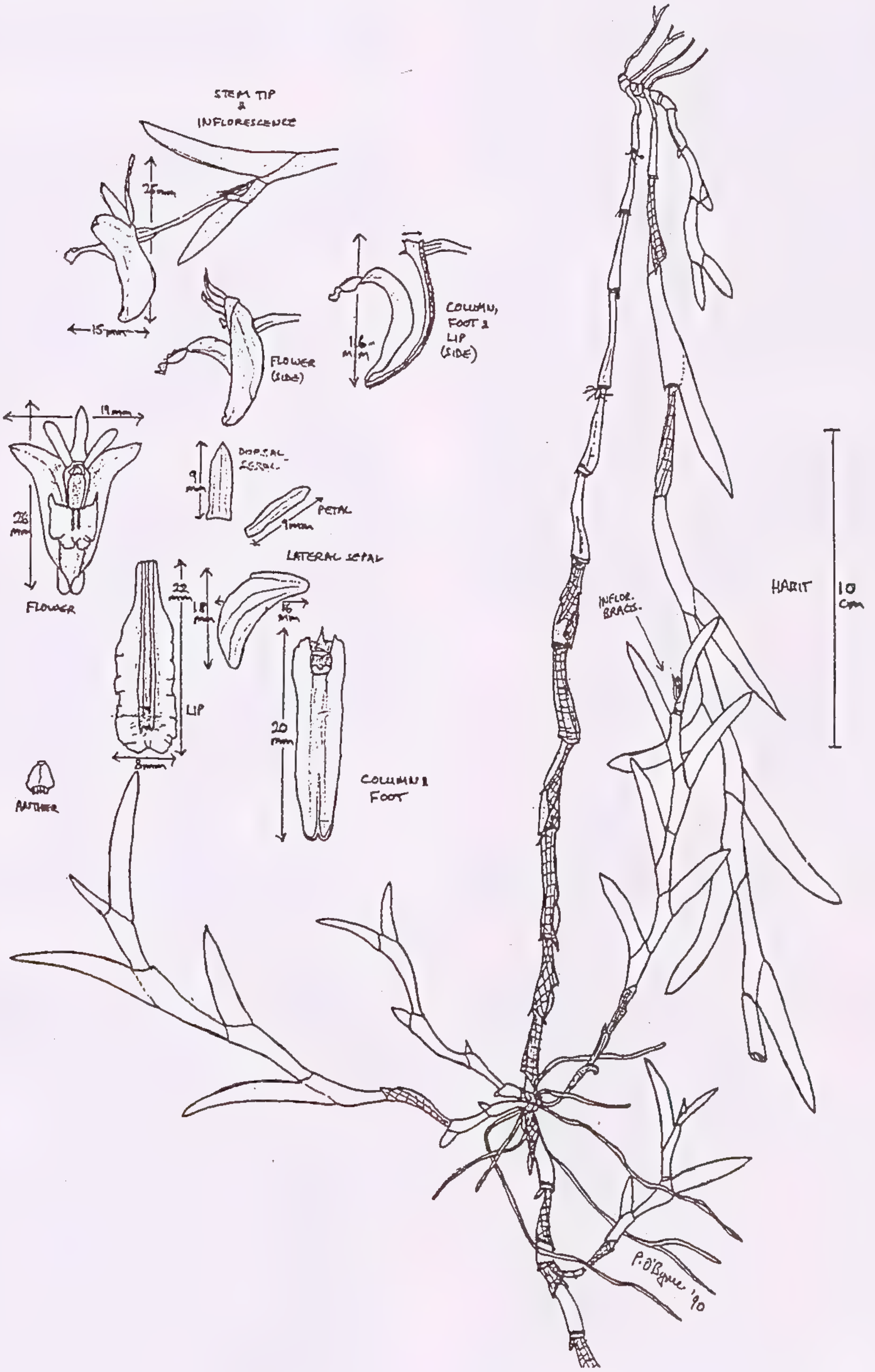
Flower: Single, ephemeral, autogamous, somewhat thick and fleshy, wide-opening to about 16 mm across, white petals and sepals with pale yellow tips on sepals. Dorsal sepal erect, elliptic, 8 mm x 4.5 mm, convex, subacute, apiculate. Lateral sepals wide-spreading, oblong, slightly dilated at base, convex, tapers steeply to apiculate apex. Mentum absent as lateral sepals joined to base of column, not the column foot. Petals spreading, linear subfalcate, constricted at base, 7 mm x 2 mm, apex subacute. Lip descending, single-lobed, lanceolate on inwardly constricted cuneiform lower half, thin margins slightly raised above fleshy floor which has a single hardly perceptible keel extending to apiculate acute apex. Column unusual, about 2 mm long x 3 mm high, anther firmly held between broad thick recurved horn-like arms and deltoid 2.5 mm foot which is not connected to lateral sepals. Pollinia in 2 rough yellow masses, each vaguely twinned, stiffly fused to head of stigma. Anther 2-celled.

Capsule: Cylindrical, about 20 mm x 6 mm, green, smooth.

Dendrobium pseudocalceolum Smith
Section: *Aporum*

Distribution: Widespread and common throughout the Papua New Guinea mainland and island provinces from about 50 m to at least 500 m altitude. It also occurs in Irian Jaya.

This attractive epiphytic species is found rooted in humus in rainforest, seasonally dry forest and semi-deciduous forest, hanging from branches of trees, especially over rivers and streams. It has long pendulous stems (the base is not swollen) that branch frequently and form many tufts of keikis, which in turn form further keikis resulting in a sprawling untidy hanging curtain that may eventually cover an area of 3 - 4 m^2 with many tangled stems and aerial roots. The stems are covered in sheaths and younger parts of the stems have 2 rows of succulent dagger-like green leaves projecting outwards at an angle to the stem. The inflorescence is formed from a bundle of dry brown bracts at each stem tip which produce 1 - 3 flowers at a time. This species exhibits communal massed flowering, all



Dendrobium pseudocalceolum from a drawing by P. O'Byrne.

the plants in an area flowering 12 - 13 days after a heavy rainfall. The very attractive delicate flowers last only 2 - 3 days, and have a faint sweet scent. The sepals and petals are crystalline white. Two small yellow keels on the lip end in a yellow spot at the front of the lip. The column foot has a yellow streak along its centre. Flowering recorded from October to April in Central Province, but is probably at other times of the year in other parts of Papua New Guinea.

Varieties: Some specimens from Manus may constitute a distinct variety of this species. They are coastal, with shorter very slender stems (up to 30 cm long). The leaves are thinner and rounder. The inflorescence is 2 - 4 flowered and lacks the yellow on the lip.

Cultivation: This species is not suited to cultivation in pots because of its hanging habit. It is best grown on trees or wood slabs with sufficient space below the plant for keikis to root. This species is easy to grow and spreads rapidly if given filtered sunlight and constant high humidity.

Description:
Roots: Many from stem base or aerial from stem nodes, smooth, white with red or green growing tips, about 1 mm diameter, long, frequently branching.

Rhizome: Creeping, very short subspherical sections 3 - 6 mm (3 - 4 nodes) long between stems, covered in red-brown bracts when young.

Stem: Suberect when young, otherwise pendulous, <60 cm long, frequently branched, a zigzagging series of slight curved laterally compressed conical internodes, each internode 15 - 25 mm x 2.4 mm, yellow to yellow-green with black nodal ring. Young stems entirely leafy, older stems leafy towards the apex. Sheathing leaf bases persistent, overlapping, 20 - 35 mm long, cylindrical, rather thick, green when young, red-brown to grey and wrinkled when dry.

Leaves: Distichous, often slightly outcurved, subulate to narrowly triangular or sublinear, 28 - 45 mm x 4 - 10 mm, very stiff, thick and fleshy, bilaterally compressed, yellow-green to green, smooth, tip acute, pointed.

Inflorescence: Terminal (rarely axillary near stem apex), a tight cylindrical cluster of 5 - 6 mm long brown to black dry bracts which produce 1 - 3 flowers at a time in succession over several months. Peduncle 2 - 3 mm, obscured by bracts; pedicel 8 - 15 mm, slender, yellow-green; ovary 3 - 4 mm, conical, 6-channelled.

Flower: Opens wide to about 25 mm high x 20 mm wide, ephemeral, delicate, fragrant, sepals and petals crystalline white, two small yellow keels on the lip end in a yellow spot at the front of the lip. The column foot has a yellow streak along its centre. Dorsal sepal erect-recurved, oblong, slightly dilated at base, about 9 mm x 4 mm, acute. Lateral sepals free almost to base of mentum, spreading-recurved, boomerang-shaped in outline with rounded acute ends, 16 mm long x 18 mm wide, 5-veined. Mentum very large, about 15 mm, in-curved, blunt apex bilobed. Petals obliquely spreading to recurved, oblong, 9 mm x 2.5 mm, upper margin irregular, apex subacute. Lip strongly decurved, about 22 mm x 8 mm, oblong on a 5 mm narrow claw, thin, not distinctly 3-lobed; margins slightly raised at sides, rather puffy towards front; blunt apex bilobed with small apicule between the lobes, margins erose; disc has 2 simple straight very shallow keels that terminate before the lip apex. Column about 2 mm, apex laterally has an upper needle-shaped tooth, otherwise blunt and smooth; foot about 18 mm, broad, incurved, ventrally 2-channelled.

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In-vitro germination of terrestrial orchids.
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Hybridisation within the genera *Dendrobium* and *Sarcochilus*.

These topics, and more, will be addressed by international and Australian speakers.

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AUSTRALIAN NATIVE ORCHID HYBRID REGISTRATIONS

(New registrations from lists in *The Orchid Review*, April to June 1992. Due to present taxonomic uncertainty, hybrid registrations will be published as they appear in *The Orchid Review*.)

NAME	PARENTAGE	REGISTERED BY
Dendrobium		
Brinawa Flame	*johannis* x *kingianum*	J. Jarvis
Brinawa Gem	Kim x Gracious Falcon	J. Jarvis
Brinawa Mist	Gloucester Sands x *speciosum*	J. Jarvis
Brinawa Spice	Gracious Falcon x *kingianum*	J. Jarvis
Brinawa Sunset	Peewee x *falcorostrum*	J. Jarvis
Chantilly	Kingara x Coljohn	W. Upton
Chanse Ryan Wareham[1]	*phalaenopsis* x Specio-kingianum	J. Grezaffi
Doug Burgess	Blushing Rose x Coljohn	W. Upton
Edda	*bifalce* x *tetragonum*	R. Job (K. McFarlane)
Gail Louise	Kim x Aussie Gypsy	T. Anderson
Ian Anderson	Kim x *tetragonum*	T. Anderson
Ice Princess	Emma x Coljohn	W. Upton
Jesmond Glitter	Zip x Sunglow	J. Purvis
Margaret Honoré	Debra Wray x *speciosum*	S. Wray
Pink Blush	Jombock x *speciosum*	W. Upton
Pink Snow	Joy Wray x *kingianum*	S. Wray
Red Squire	Jombock x Red Baron	W. Upton
Sarah Jane	Elegant Heart x *ruppianum*	W. Upton
Seletar Microchips	Merritt Island x Artic Gem	David Lim
Parachilus		
Jonathon Epstein	*Sarco.* Wandjina x *Psarco. spathulatus*	Florafest (I. Klein)
Sarcochilus		
Cherie's Wine	Cherie x *weinthalii*	Florafest
Double Wine	Weinhart x *weinthalii*	Florafest (I. Klein)
Sharon	Wandjina x *fitzgeraldii*	Florafest (I. Klein)

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[1] In 1978, S.C. Clemesha reduced *Dendrobium phalaenopsis* Fitzg. to synonymy with *Dendrobium bigibbum* ('A Review of *Dendrobium bigibbum* Lindl.' *The Orchadian*, 6: 27 (1978)) as a new subspecies, *Dendrobium bigibbum* Lindley ssp. *laratensis* Clemesha, and referred plants grown

for many years as *D. phalaenopsis*, *D. phalaenopsis* var. *schroederianum* and *D. schroederianum* to this subspecies. In his 'Catalogue of Australian Orchidaceae' (*Australian Orchid Research* 1: 1-160 (1989)), M.A. Clements states that *Dendrobium schroederianum* Hort. ex L. Gentil is a nomen nudum, and formally described this Indonesian species as *Dendrobium striaenopsis* M. Clements et D. Jones, and reduced *D. bigibbum* ssp. *laratensis* to synonymy with it.

Clements also considers that *Dendrobium phalaenopsis* Fitzg. is an Australian taxon which occurs mainly on the eastern side of the Great Dividing Range in northern Australia, and differs morphologically from *Dendrobium bigibbum* Lindl. which is found on the drier, western side of the Great Dividing Range, Torres Strait islands, and Papua New Guinea. Because the origin of the plant named as *Dendrobium phalaenopsis* used to make the hybrid Chanse Ryan Wareham is unknown, this hybrid is included here to satisfy those readers who believe that either Clemesha or Clements is correct in their taxonomic treatment of the taxon referred to generally as *Dendrobium phalaenopsis*.

BOOK REVIEW

NEW TAXA OF AUSTRALIAN ORCHIDACEAE: AUSTRALIAN ORCHID RESEARCH VOLUME 2 - A NEW ZEALAND PERSPECTIVE

by D.L. Jones, 1991. Octavo, soft cover, 64 colour photographs, 111 black and white line drawings, 207 pp. Price: AUS$24.50

[Ed. - This review, a New Zealand viewpoint, was published first in the *New Zealand Native Orchid Group Journal*, No. 39, September 1991, pp. 8-10. It follows a review of the same paper published in *The Orchadian* Volume 10, No. 6, pp. 197-198 (1992).]

Recently I reviewed an advance copy of *Australian Orchid Research Volume 2*, courtesy of Gerald McCraith of the Australian Orchid Foundation. Published by the Foundation in cooperation with Reed Books on 5 April 1991, Volume 2 is devoted entirely to "New taxa of Australian Orchidaceae". David Jones of the Australian National Botanic Gardens, Canberra, is the sole author. In all, Volume 2 contains descriptions of 108 new species and two natural hybrids in the genera *Acianthus* (five spp.), *Arthrochilus* (six spp.), *Caladenia* (31 spp.), *Chiloglottis* (eleven spp.), *Corybas* (five spp., one hybrid), *Dipodium* (four spp.), *Diuris* (fifteen spp., one hybrid), *Gastrodia* (five spp.), *Genoplesium* (fifteen spp.) and *Prasophyllum* (eleven spp.). The volume consists of 84 pages of text, mainly descriptions of new taxa, sixteen pages of colour plates illustrating 64 new taxa, and 105 pages of line drawings depicting all the taxa described.

David Jones is a prolific author of books and papers on Australian plants, and this volume represents the results of ten years' intensive study and a lifelong association with Australian orchids. As the author notes, some of the new taxa have been well known for years, while others have been overlooked or "lumped" into species complexes - a situation not unlike that in New Zealand, though clearly on a much larger scale.

The descriptions of new taxa follow David Jones' now-familiar, standardised and informative layout that includes a useful "notes" section and an estimate of the conservation status of each taxon. His line drawings are clean, diagnostic and easy to follow, while the colour section provides a further dimension and aid to the recognition of many of the taxa.

As far as I can judge at this stage, only one New Zealand orchid is affected by this treatment, namely the recent migrant discovered at Hanmer, the Richmond Range and Iwitahi, and previously assigned to *Chiloglottis gunnii* Lindley (Johns and Molloy, 1983; Molloy and Johns, 1983; Gibbs, 1988). It is now clear that this name has been applied to several related but distinct taxa. Four of these are described as new - *C. chlorantha* D. Jones, *C. pluricallata* D. Jones, *C. turfosa* D. Jones, and *C. valida* D. Jones. The last-named, *C. valida*, is confirmed by comparison of specimens and type material as the taxon occurring in New Zealand and formerly referred to as *C. gunnii*. (D. Jones *pers.comm.*, 1991).

As its name implies, *C. valida* is a robust orchid and "the most vigorous species in the genus". It differs from *C. gunnii* (now considered a Tasmanian endemic of restricted distribution) by its more robust habit, longer peduncles, larger flowers, narrower and sparser laminar calli, and broader column wings. Other new taxa of *Chiloglottis* described all belong to the ant-like *C.reflexa/C. formicifera* complex.

Of the 31 new species of *Caladenia*, 23 belong to the large-flowered group, or spider orchids, which do not occur in New Zealand, and eight belong to the small-flowered group that do; all eight being part of the *C. carnea* complex.

Four out of the five new species of *Acianthus* are closely related to *A. fornicatus* R. Br. which is now regarded by David Jones as a species distinct from *A. sinclairii* J.D. Hook. of New Zealand.

Australian species of *Corybas*, or helmet orchids, are noted for the absence of long filiform appendages found in many New Zealand species. Five of these and one natural hybrid are described as new, including one, *C. abditus* D. Jones, which closely resembles *C. unguiculatus* (R. Br.) H. G. Reichb.

Four out of the five new taxa of *Gastrodia* are related to *G. sesamoides* R. Br. and each "can be discerned by subtle yet recurrent differences in floral morphology, growth habit and habitat preference". None of these new taxa are known to occur in New Zealand.

Fifteen new species are assigned to *Genoplesium,* a segregate genus of *Prasophyllum* recently reinstated and circumscribed by David Jones and Mark Clements (1989). This genus includes two taxa shared by New Zealand and Australia, *G. nudum* (J.D. Hook.) D. Jones et M. Clements, and *G. pumilum* (J.D. Hook) D. Jones et M. Clements. None of the new taxa described are closely related to these two.

In another genus represented in New Zealand, *Prasophyllum*, eleven new species are described, all related to other known Australian taxa. Three other genera treated, *Arthrochilus, Dipodium* and *Diuris*, are not represented in New Zealand.

Volume 2, authored by David Jones, is a logical outcome of *Volume 1*, a "Catalogue of Australian Orchidaceae" in which Mark Clements (1989) brought together under one cover the type specimens of most Australian orchids. Clements' important and monumental work is basic to current and much-needed taxonomic reappraisal of orchid genera in Australia. It has important implications for New Zealand too in determining the correct application of several orchid names (see St George, 1990).

Volume 2, together with other publications emerging on the taxonomy of Australian orchids, signals a revival of research interest in these plants, more particularly in preparation for the treatment of the family in volume 47 of the *Flora of Australia*, scheduled for publication in 1994. While it has little direct bearing on the taxonomy and names of New Zealand orchid taxa, *Volume 2* should nevertheless be required reading for all orchid enthusiasts in this country. The introductory passages especially carry several important messages such as the necessity of studying fresh material and the importance of *in situ* field studies. For working taxonomists, the great advantage of having a network of volunteer associates throughout the country is amply demonstrated in Jones' work by the large number of new species collected by regional people. The descriptions, line drawings and colour illustrations of the various taxa are a mine of information and an object lesson in identifying and highlighting characteristics of diagnostic value. Some of the terms are new and coined by the author out of necessity. I am confident that all orchid enthusiasts will benefit from David Jones' timely treatment and his extraordinary insight into the makeup and lifestyle of orchids.

Australian Orchid Research Volume 2 is reasonably priced at AUS$24.50 plus postage, and copies are available from the Australian Orchid Foundation, 107 Roberts St, Essendon 3040, Victoria, Australia.

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Brian Molloy

BULBOPHYLLUM MINUTISSIMUM F. MUELL.

J. Roberts
'Tangara', M/S 208, Numinbah Road, Advancetown, Qld. 4211.

This hard-to-find plant resembles a miniature string of flattened match-heads, and was discovered by Archdeacon King in 1849, just outside of young Sydney Town, at Rushcutters Bay, on rocks at the top of a waterfall, and was sent to R.D. FitzGerald for description.

Bulbophyllum minutissimum can be found along the coastal regions, and up into the Great Dividing Range, on rocks or trees, in a wide range of habitats; mangrove trees in the tidal coastal reaches, fig trees in the rainforest highlands, rocky outcrops, cliff faces, boulders and ravines. With a distribution from central Queensland (Blackdown Tableland) to Milton on the south coast of New South Wales, you would expect to come across this widespread orchid on a regular basis, but this is not the case. I grew up along the Hawkesbury River system, in central eastern New South Wales, and I never noticed it there. I then spent many years around the Hunter River valley, and never noticed it there either. On moving to the greatest area in Australia (No! I am not biased, of course), where I started to observe and grow orchids, it was several years before I was to see this orchid *in situ*, but it was not for the lack of trying to find it.

The first piece I was given clung to a small fragment of bark from a species of *Ficus*, which, I was informed, originated from forestry felling in the Bonalbo area in northern New South Wales. I attached the piece of bark and orchid onto a slab of tree-fern, and it is still growing over the tree-fern today, but is not 100% happy (I suspect the tree-fern fibre is going sour).

The next piece of *Bulbophyllum minutissimum* I was given was mounted on a slab of old weathered hardwood fence paling. This plant has now covered the face of the paling, and started growing on the other side as well. This particular clone originated on a rock outcrop west-north-west of Gympie, in southern Queensland. Some years later, I had the privilege of seeing the 'mother' plant *in situ*. It grew on the western side in amongst the moss. Most of the clone had survived the years of drought and bushfires. Where the moss was still moist, the pseudobulbs were green, but those in more exposed positions had turned red-purple.

Little did I realise at that time, but I had been walking past numerous clones of *B. minutissimum* for several years. One of my previous occupations (and pastimes) involved tramping over the islands in the southern end of Moreton Bay, just north of Surfers Paradise. I had observed other orchids on the island's interiors and on the casuarinas along the river systems. I had certainly noticed the *Dendrobium teretifolium* growing on the mangroves, but not the masses of *B. minutissimum.* A chance discussion with a very observant local fisherman told us that it grew on the 'red mangrove' (*Bruguiera gymnorrhiza*). We were advised about particular trees to investigate, and, sure enough, there "they" were! The largest or most extensive clone/s that I have seen to date grow on one particular red mangrove, totally encircling the trunk, for nearly two metres and extending out onto the branches. In many places, it had grown over the top of older and dead pseudobulbs, which were originally embedded in the coarse bark. We looked at all the red mangroves in the area, and found *Bulbophyllum minutissimum* on most of the mature trees. It usually grows on the underside of the upper branches, where it gets some protection from the harsh sunlight and heat. Needless to say, most of these mangrove trees are standing in salt water at high tide. As ageing starts, the trees die back and the bark peels off the dead branches and falls into the water and mud, and any plants of *Bulbophyllum minutissimum* are quickly killed. However, the dead bark can be prized off, and orchids saved and remounted onto old hardwood fence palings, tied in place with cotton. By the time the cotton rots, the plants have established themselves with healthy root systems. To date, I have not found *Bulbophyllum minutissimum* in the hills and rainforest areas of the Gold Coast hinterland, but I am still looking!

PTEROSTYLIS NANA R.Br.: SPECIES OR SUBGENUS?

R. Bates
38 Portmannock Street, Fairview Park, S.A. 5126.

[Ed. - This article was published first in *N.O.S.S.A. Inc. Journal*, 15(9): 94, in October 1991.]

Only ten years ago, the name *Pterostylis nana* was applied to every one of the little greenhoods which have an inflexed tooth in the sinus of their conjoined lateral sepals. Since then, we have gradually seen species being split off. *Pterostylis dilatata* was described as a species from Western Australian with cauline leaves, not rosette leaves like most of the others. *Pterostylis pyramidalis* was recognised as a Western Australian species from swampy ground with leaves up the stem - broad at the base, narrow above. Nevertheless, it was easily demonstrated that there were still as many different forms as there were habitats. *Pterostylis nana* occurred in swamps, coastal sandhills, forest, heath, mountains and desert rock outcrops in rich soil or poor. Some flowered as early as April, some as late as December. Could they all be the same species?

About 1985, I decided to investigate the group in more detail. We had long known that *P. nana* in the mallee looked different from *P. nana* in the Adelaide Hills. It did not take long to find places where both occurred together, and, as expected, they did not interbreed. What is more, they actually attracted different pollinators, and just as importantly, the little round bodied flies that pollinated both were only distantly related to the long-bodied fungus gnats that visited most other greenhoods!

Research in South Australia soon showed that as many as three different *P.* aff. *nana* actually occurred in the same area, and that these were habitat specific. It was soon clear that at least four totally different species occurred commonly in South Australia, i.e. "Hills nana" (with white hairs on the scape); "Mallee nana" (with tiny laterally compressed flowers and round leaves on long petioles; "Coastal nana" (with crenulate leaves and large, brown tipped flowers) and "Veined nana" (with blue green sagittate leaves distinguished by their prominent veins - the flowers being reticulate veined and turning red with age). Each is pollinated by a different fly!

Further research showed that each of these could be divided into races or subspecies. "Hills nana" has a look-alike cousin found in the semi-desert areas; the differences are not as obvious as between the four species, and work on their pollinators has not given clear-cut results, but, biologically, the two require different habitats. Furthermore, the desert ones do not last long in cultivation!

In 1986, when the first "Veined nana" were collected at Hale Conservation Park in the Adelaide Hills, they were thought to be a relict species. This year, however, on a trip to central Eyre Peninsula in July, it was discovered that "Veined nanas" were common in that area. But there were differences, for a start they did not have the rigid leaves or short stemmed flowers of the Hale specimens. Again we were probably looking at two subspecies.

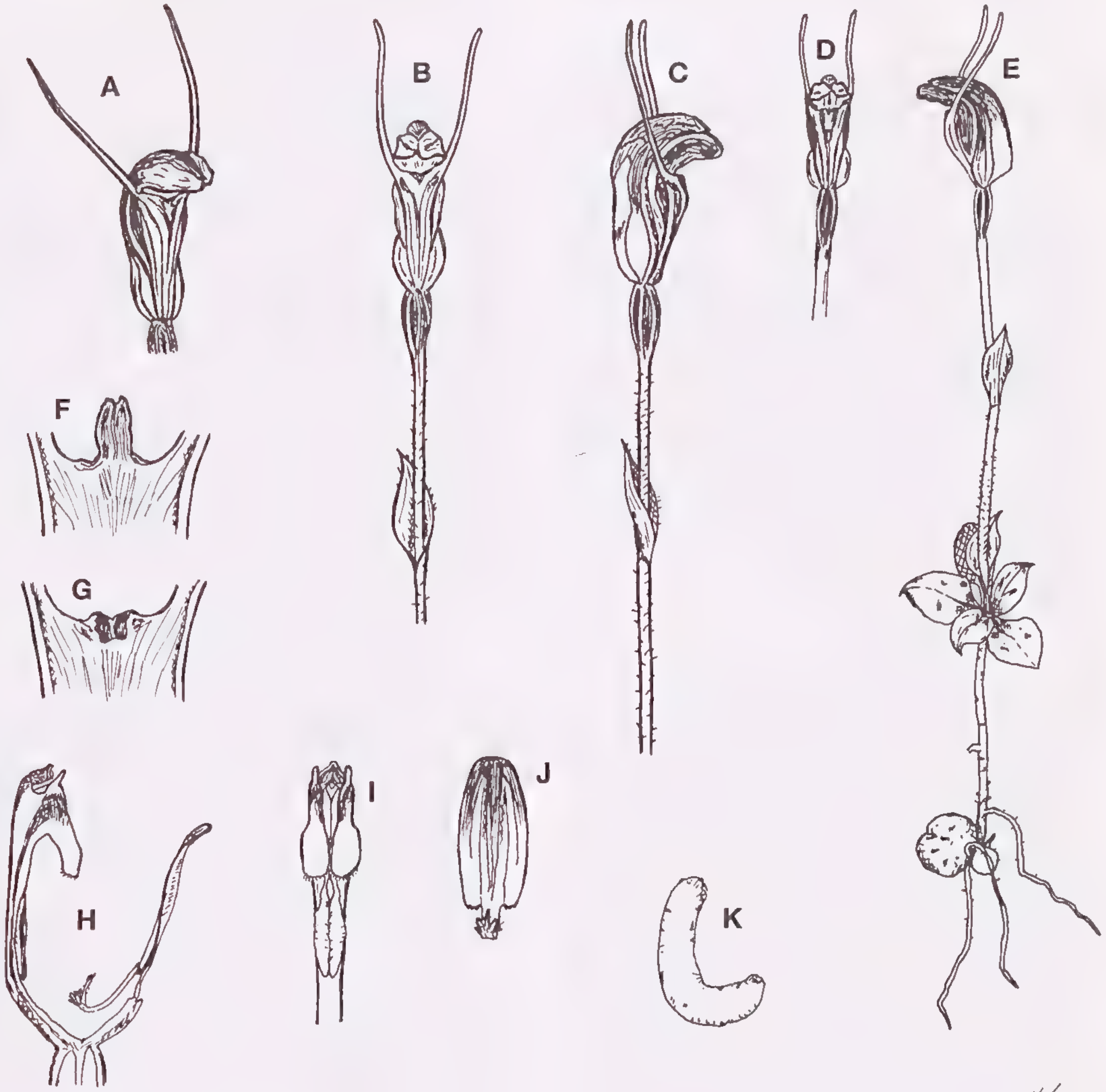
Then a third race or subspecies of "Hills nana" was found on rock outcrops overlooking the sea on Fleurieu Peninsula and Kangaroo Island. These had fleshy narrow leaves and pinched flowers.

Hybrids are common between most of the *Pterostylis* species, but none of the *P. nana* complex are known to cross with species of any other complex. Add this to the quite different suite of pollinators, the constant nature of several morphological features, and the remarkable diversity of species to suit different habitats, and you will see that what was once regarded as a single species, then a species complex, might now be regarded as a subgenus!

In Western Australia in 1990, I found no less than 20 different kinds of "*P. nana*". Many of them highly localised, i.e. one grew only in the Porongerups, another only around Lake Muir. So *P. nana* is not even a small subgenus.

I have no doubt that there is enough work to be done yet to last many years as we try to unravel the relationships between the different taxa.

Which are true species? Which are only races? How specific are the pollinators?



Pterostylis nana **R.Br.**

Drawings B and C from South Coast, N.S.W. balance from Western Australia.

Walter T. Upton
JUNE 1964

A	Flower 2X
B	Flower front view 1.3X
C	Flower side view 1.3X
D	Flower front view 1X
E	Plant 1X
F	Sinus, inside view, showing appendage unfurled 4X
G	Sinus, inside view, appendage in normal position 4X
H	Column and labellum side view 4X
I	Column front view 4X
J	Labellum 4X
K	Pollinia greatly enlarged

Pterostylis nana R. Br. from a line drawing by W. Upton.

TWO VIEWS OF CULTIVATING *CYMBIDIUM CANALICULATUM* R. BR.

Ed Thorogood
398 Scarborough Road, Scarborough Qld. 4020.

[Ed. - This article was printed first in the *Native Orchid Bulletin*, published by the Native Orchid Society of Queensland Inc., and is reprinted here in the interests of the wider readership of *The Orchadian*.]

Two years ago I would have endorsed the ideas listed in "View 1" wholeheartedly. I considered it by far the best article I had ever come across on the culture of this orchid. Today, because of my own experiences over those two years, I must disagree completely.

Unfortunately the *Pine Orchid Post* where "View 1" was first published, does not supply the name of the author of this view. He or she obviously knows their subject very well, and has looked into it thoroughly. For this 'I dips me lid'. I shall print the article first and then relate my experiences with this orchid afterwards.

View 1 - The Article

Cymbidium canaliculatum is among the most flamboyant of Australian native orchids. Specimen-sized plants are often covered in thousands of mottled green, brown and chocolate blooms. Its spring display is stunning. Its cascading racemes graceful, and its fragrance enticing.

However, *C. canaliculatum* is one of Australia's most misunderstood species. Enthusiasts and experts alike, consider it difficult to grow under cultivated conditions. A widely held myth is that *C. canaliculatum* will persist for a year or so before invariably dying. This myth reflects a poor understanding of the basic cultural needs of *C. canaliculatum*. The natural habitat of this species, and its survival strategies in coping with that habitat, provide vital clues about its needs for successful cultivation. Many growers have ignored these clues, and have unwittingly followed a recipe for disaster.

Cymbidium canaliculatum is ideally equipped to tolerate dry inland climates with extremes of temperature. Its channel-shaped leaves (from which it derives its name) efficiently channel moisture to its root system. Heavy dews and fogs are sufficient to sustain this species for months on end. Excess energy is stored in solid pseudobulbs which are capable of surviving severe frosts and bushfires.

Cymbidium canaliculatum typically grows in the hollows of dead trees well above ground level where it is exposed to hot summer sun, cold winters, low humidity and almost constant air movement. This is another survival strategy. The host tree provides the root system with excellent insulation against temperature extremes. Insulation also keeps moisture loss to a minimum. An extensive root system penetrates deeply into the decaying wood, which has good moisture retention properties.

Once these survival strategies are understood, the challenge is to incorporate them into an appropriate cultural programme. The aim is to simulate the natural habitat with some adjustment to the cultural programme to compensate for any climatic differences.

The decayed heartwood from eucalypt trees is a frequently recommended medium in which to grow *C. canaliculatum*. While this medium may be the natural and ideal choice for dry inland climates, it lacks the quick drainage properties required in wet and humid climates. A good open mix for such climates is an equal parts mix of medium bark, charcoal and crushed polystyrene foam. Drainage is improved by using polystyrene cubes in the bottom of containers.

The choice of containers is as critical as the choice of medium. They must provide good insulation against temperature extremes. Plastic containers must be avoided as they provide little protection for the root system. They allow the roots to cook in the summer and freeze in the winter. Terracotta pots are a good compromise, but the best choice of all is hollow logs.

An obvious recipe for disaster is to attempt to grow *C. canaliculatum* in the glasshouse or shadehouse alongside cattleyas and other 'indoor' orchids. The light level will be too low, the humidity too high, and the air circulation inadequate. While there are always exceptions, the general trend will be failure. Similarly, never attempt to grow this species outdoors under heavy or even moderate shade. The almost terete-like leaf structure reveals that *C. canaliculatum* demands exposure to full sunlight.

Watering *C. canaliculatum* every day or so (even when grown outdoors) is another recipe for disaster. This problem is compounded during cold or cloudy weather. A successful watering programme must recognise that this species is capable of coping with drought conditions. It must be allowed to dry out before being re-watered.

The time comes when old specimen-sized plants require reconditioning, or when decayed medium must be removed from younger plants. Do not be perturbed by claims that root disturbance usually proves fatal. This is a job that must be done. Decayed medium may lead to poor drainage - and this will prove fatal! While this species is at its most vulnerable when it suffers root disturbance, a couple of basic precautions will minimise loss.

The first precaution is to drench all newly repotted plants with Fongarid to minimise the risk of root rot. Plants must be then kept dry apart from a misting of half strength liquid fertiliser every second day. Do not water thoroughly until new growths and roots develop. Repeat the application of Fongarid after four weeks and periodically thereafter during humid weather.

View 2 - My Experience

Because I like to experiment, against all the rules and theories about *C. canaliculatum* growing, but based on a considerable amount of personal knowledge of this orchid, in Autumn 1990, I potted a nice seedling in straight sphagnum moss. At first thought, this might sound rather silly to people who have only seen this orchid some considerable distance inland. However, I have seen *C. canaliculatum* growing right down to the coast, and even one on Bribie Island.

No doubt in the middle of a severe and prolonged drought, the root system may dry out (I do not really think the plant would enjoy this very much), but my experience has been that, in nature, I have always found the root system to be quite damp.

Bearing this in mind, I considered it quite feasible that the plant would do very well in sphagnum moss. Six months later, as the plant was looking so beautifully healthy, I could not stand it any longer and pulled it out of the pot. The mass of roots, three parts of the way down the pot looked, 150% healthy. That was enough to convince me.

I have subsequently potted all my *C. canaliculatum* and *C. suave* into a mixture made up of polystyrene and sphagnum moss. Today, I could not ask them to look better.

In my collection, I have *C. canaliculatum* collected from Dalby, Beaudesert, and Childers, just to mention a couple of the inland ones. Three separate plants, which comprise only three to five bulbs, now have three new leads each. The *C. canaliculatum* var. *sparkesii* have never looked so good, and my *C. suave* have lots of new leads. Some small *C. madidum* in this mixture are also thriving.

Because clay pots dry out the medium, I use plastic pots. They are watered with an overhead sprinkler system whenever my other orchids are watered. With me, it is a case of 'shape up or ship out', and very few ship out.

In the bottom part of my pots, I use a mixture comprising four parts of polystyrene which will go through a 18 mm sieve (smaller with smaller orchids) and one part of dry sphagnum moss or German peat pushed through a 6 mm sieve. To a 10-litre bucket of this mix, I add a quarter of a cup of 9 month Osmocote. The top mixture consists of equal parts of long strand or short strand sphagnum moss and polystyrene which will go through a 12 mm sieve. Again, to a 10-litre bucket of this mix, I add a quarter of a cup of 9 month Osmocote.

Taking an appropriately sized plastic pot, depending on the amount of roots salvaged, hold your plant in the centre of the pot and work the bottom mixture into the pot until it is about three-quarters full, pushing down hard around the edges of pot. When you add the top mixture, this will push the bottom mixture into about half the pot. Do not use a stick to ram the mixture down, but push the mixture as hard as you reasonably can with your hands into the pot.

Leave the mixture about 10 mm from the top of the pot, and top up with 10 mm charcoal, pushing the mixture harder into the pot. Do not fiddle around with misting. Just keep the water up to the plant. A drop of fungicide certainly will not do any harm. Decrease the frequency of watering to once a week during winter.

The reason for the charcoal on top? Earlier plants potted in sphagnum moss developed a black slime on the top of the moss. I think this was some form of algae. The charcoal on top prevents this.

I consider this my MAGIC MIXTURE. I now have plants of all genera in my collection in this mixture on an experimental basis. The *Dendrobium canaliculatum* is growing well, as also is *D. trilamellatum*. These are growing far better than they were on a hardwood slab. My suggestion is that, for a start, you just try two or three of each type of plant in it, and see how you go for a year.

CORRESPONDENCE ON *DENDROBIUM SPECIOSUM*

I have placed the comments of Tony Slater (Orchadian Vol. 10 No. 7 p.236-238) relating to the review of *Dendrobium speciosum* (Orchadian Vol. 10 No. 5 p.124-140) before four of the doctoral orchid botanists who reviewed my submission prior to publication. The feedback I have received from each of them concludes that his comments concerning pollination and reproductive biology result from misreading and misperception of the review and do not require a detailed reply. The *Dendrobium speciosum* project involves many associates in eastern Australia and is a continuing study in its twelfth year.

Loading experiments have been repeated using different plants during several seasons with the same result of significant capsule drop from heavy loading (p.132). Individual racemes (spikes) may indeed carry high numbers of seed pods, a result that does not, as Tony Slater implies, negate the findings of loading experiments.

Contrary to statements made by Mr Slater, the review clearly states that there is evidence, noted by many of the listed associates of this study, for successful self pollination in varieties of *D. speciosum* tested under warmer conditions in several states other than Victoria on numerous occasions (p.131, 132). The same result has been found in Victoria during seasons where temperatures are significantly warmer during the post pollination period. Further misreading includes reference to the *Dendrobium* beetle (p.133), the review clearly stating "no evidence . . . for pollination"; to multiple pollinators (p.134), which the review clearly stresses applies for this species and cannot be used in taxonomic splitting; and the statement that the list of pollinators is incomplete. The list of pollinators is complete and includes insects described by Tony Slater (p.133-4).

Fragrance components have been found to be collected from *Dendrobium* by bees and the same collecting behaviours and accumulation of fragrance observed using papers containing isolated fragrance chemicals. This work will be published in collaboration with Professor Holman of the Hormel Institute, USA.

The Orchadian has devoted sixteen pages to the review and for reasons of space cannot include all of the material and detailed discussion respondents and writers would like to include. The review emphasizes the need for more detailed work to be done on *D. speciosum* and all other Australian orchids and there are many areas that require attention, including genetic studies, which Reg Angus (Orchadian Vol. 10 No. 7 p.238-239) asks about and answers, as does the review in stating that this work is still to be undertaken with Australian orchids.

Further progress in understanding our orchids requires a constructive and co-operative approach. I am especially grateful to those people who have supported and continue to support this long term project.

Dr PETER B. ADAMS,
School of Botany, University of Melbourne

Editorial Note: The review of *D. speciosum* by Dr P. B. Adams was reviewed by five professional botanists prior to publication and their suggestions incorporated in the final text. The published account is considered by them to be an accurate representation of the current status of published information on *D. speciosum*. It is Orchadian policy to submit all scientific papers to a high level of professional peer review. In fairness to contributors, criticism of accepted papers will themselves in future be subject to the same process, as indicated in the Editorial of Orchadian Vol. 10 No. 5 1991. The review process has considered and discounted the critical comments made in Vol. 10 No. 7.

Dear Editor,

It was with considerable disappointment that I read the letter written by Tony Slater (Orchadian Vol. 10 No. 7 p.236-238) in which he criticised the review "Variation, Multiple Pollinators and Breeding System in *Dendrobium speciosum* Smith; A Biological Review" by Dr P. B. Adams (Orchadian Vol. 10 No. 5 p.124-140).

I personally had found the review extremely interesting. It provided much needed information about the species. The study is obviously a long-term and continuing project.

Having re-read the article by Dr Adams in the light of Mr Slater's comments, I find his criticisms were unfounded. Indeed, in many instances, Mr Slater's comments indicated that he has either misinterpreted the information and/or quoted out of context. There were many examples that I could have cited but the following few will serve to illustrate my point.

The review does not claim the *Dendrobium* beetle to be a pollinator, in fact it states the opposite. In the section "Breeding Systems", while Slater's comment that the isolated plants of *D. speciosum* var. *hilli* could have been pollinated by pollen from another plant in the area may be valid, it should be noted that at no stage, did Adams say that these were positively identified as self pollinations. His only comment was that the seedlings produced were of the *hilli* type, no definitive conclusion was offered, just a note that these may have been examples of self pollinations. In further comments about "Breeding Systems", Slater's references to Table 4 in Adams' review were clearly unfounded – the results specifically referred to the 1990 season in Melbourne and yet the quote given by Slater had been taken out of context. The complete sentence was referring to results of experimental pollinations in Queensland and New South Wales.

The statements made by Slater on the "Capacity to develop mature seed capsules" were unwarranted. Adams had already acknowledged that some plants had been obsereved to set a large number of seed capsules and merely stated that the results obtained only "indicates a balance between resources invested in vegetative effort (growth) and in seed production". He then went on to say: "The capacity of northern varieties to produce seed is currently being investigated".

I am concerned that the comments of the type and length submitted by Mr Slater can be published without adequate review.

JACINTA M. BURKE

RESEARCH ACTIVITIES

[Ed. – This report was prepared from information provided by Gerald McCraith.]

WANDERING, OBSERVING & RECORDING

Investigator: R. Crane, 108 Landsborough Road, Maleny, Qld. 4552.

Acknowledgment: Financial support from the Australian Orchid Foundation is acknowledged.

The cyprus pine country around Chinchilla, Queensland, has always appealed as a suitable location to look for terrestrial orchids. In 1991, I obtained all necessary permits and paper work to inspect some of the surrounding State Forest. The first trip took place in May, during one of the driest years on record.

In the first 4 days of the planned 5-day trip, all I had located were three plants of *Cymbidium canaliculatum*, and a single rosette of a *Pterostylis* species near a cypress pine tree. Plans for the final day were changed so as to return to the area where the rosette had been located. Within an area approximately 250 m by 50 m, several rosettes, all without flowers, were located in the protection of trees, low bushes, and fallen branches. Having noticed a similar area approximately 1 k away on my trip in, I moved to this location. Here I located another 20 rosettes, also without flowers, and again located in the protection of old tree tops or under low shrubby bushes.

The only other sign of terrestrial orchids was a single plant of a *Caladenia* species. In order to identify the *Pterostylis* species, it would be necessary to collect flowering specimens. Since it was possible that they belonged to the rufa group, a return trip was made in September, 1991. The drought conditions had not broken since my last visit in May, and flowering was very sparse. I collected flowering specimens, including tubers, and planted them into pots at home. The flowers were pollinated, and the resultant seed pods were forwarded to the National Botanic Gardens, Canberra. Fresh flowers were also forwarded for identification. It appears to be an unidentified taxon, being recorded as *Pterostylis* sp. aff. *rufa.* As the species is only known to occur in this one location, I have asked the Queensland Forestry Service to preserve an area 250 m by 50 m when logging reaches this area in the near future. A reply has been received from the Queensland Forestry Service stating that the area requested has been marked out, and instructions issued to staff and contractors to avoid disturbance to that area.

This is not the first time I have had such cooperation from the Queensland Forestry Service. Some years ago in the Brisbane Forest Park, the only two known locations of an unnamed *Pterostylis* sp. aff. *longicurva* were threatened by a controlled aerial burn. Upon a request to consider saving these two locations, the Service agreed to bypass them when burning. When the forestry representative and I visited the sites, it was considered almost impossible to put fire breaks around them due to the very steep rugged terrain. Agreement was then reached to withhold the burning until at least the beginning of October, instead of August as planned. By this time, the new tubers should have been mature enough to survive the burning. This appears to have been successful because the two colonies do not appear to have suffered any loss of numbers.

I would like to thank the Service for their co-operation on behalf of all native orchid enthusiasts. It is a pleasure to be able to work in conjunction with an organisation such as this.

After the success of the trip to Chinchilla, I decided to look at some similar areas north of Roma. In similar country and vegetation to that near Chinchilla where the *Pterostylis* sp. aff. *rufa* specimens were located, two flowering specimens and a number of vegetative plants were found of a *Pterostylis* species different from that located in the Chinchilla area.

In another location to the south-east of Roma, again in similar country and vegetation, numerous flowering specimens of the same *Pterostylis* species as that north of Roma were located. Fresh flower samples were collected for the National Botanic Gardens, and spirit samples for the Queensland Herbarium. Advice received from Canberra is that these two recordings are the same species, and are an unidentified taxon, being recorded as *Pterostylis* sp. aff. *mitchellii.*

No doubt, by taking note of the similarity in vegetation and soil type between different locations, it is possible to find terrestrial orchids where none might be expected to occur.

I found these two trips very interesting and rewarding, and the experience has left me wondering what other species there are in these vast areas waiting to be located.

CORRIGENDA

I apologise to the readers of *The Orchadian* for the following mistakes which appeared in recent issues:

Vol. 10, No. 5:
The article "The Border Wonder: *Sarcochilus hartmannii* F. Muell." by J. Roberts, was listed in the **Contents**, but was published in **Vol 10, No. 7, pp. 223-225**. I apologise to John Roberts for this error.

Vol. 10, No. 6:
The front cover was listed as *Bulbophyllum macphersonii* Rupp, but was *Dendrobium lichenastrum* (F. Muell.) Kraenzl.
On page 176, credits for the photos of *Diuris corymbosa* and *Dendrobium* Mini Pearl were given to Walter Upton, when Russell Lea should have been acknowledged for his skilled work. I apologise to Russell Lea for this error. - Editor.

No. 4: *Pterostylis coccina* FitzG.

Common Name: Scarlet Greenhood

Subfamily: Orchidoideae
Tribe: Diurideae
Subtribe: Pterostylidinae
Genus: *Pterostylis* R. Br.

Distribution: The genus *Pterostylis* is endemic to Australasia. *P. coccina* is found in New South Wales, ACT and Victoria.

Notes: All *Pterostylis* are terrestrial orchids, but occasionally plants can be found growing on treefern trunks. *Pterostylis coccina* is a colony forming orchid which flowers in autumn. This species has a basal rosette of leaves on non-flowering plants, while the flowering plant has three to five leaves on the stem of a single flower. The flower is distinctly a *Pterostylis* with the lateral petals and dorsal sepal partially fused into a hood, known as the galea. The large flower, up to 4.5 cm long, is distinctly banded with either green or brown bands which deepen to red or scarlet with age. The dorsal sepal is much longer than the lateral petals, ending in a filiform point, and the labellum protrudes from the wide sinus between the lateral sepals. The labellum of *P. coccina* has a counter balance which, once tipped by a pollinator, closes the labellum against the galea, directing the pollinator through a tunnel formed by the column wings, and past the reproductive organs of the flower.

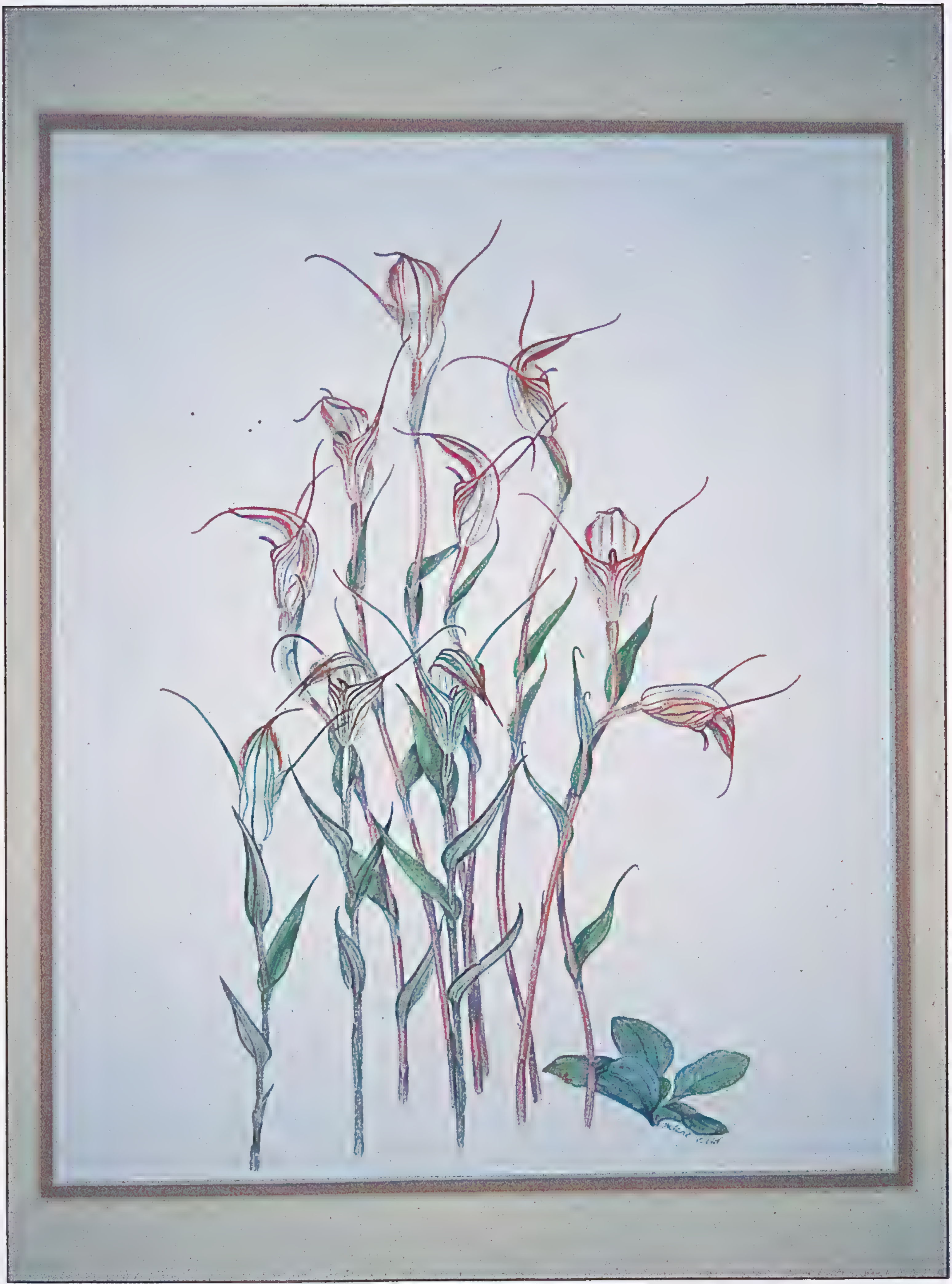
Pollination: There is no recorded pollinator for this species. A few species of *Pterostylis* are reported to be pollinated by fungus gnats.

Conservation Status: This species is considered to be vulnerable in Victoria.

Culture: *Pterostylis coccina* is a colony forming terrestrial. These orchids grow well under 50% shade in a basic terrestrial orchid mix. As this orchid flowers in early autumn, the pot should be watered from early summer to late spring, and the plants flower better if kept cool over summer.

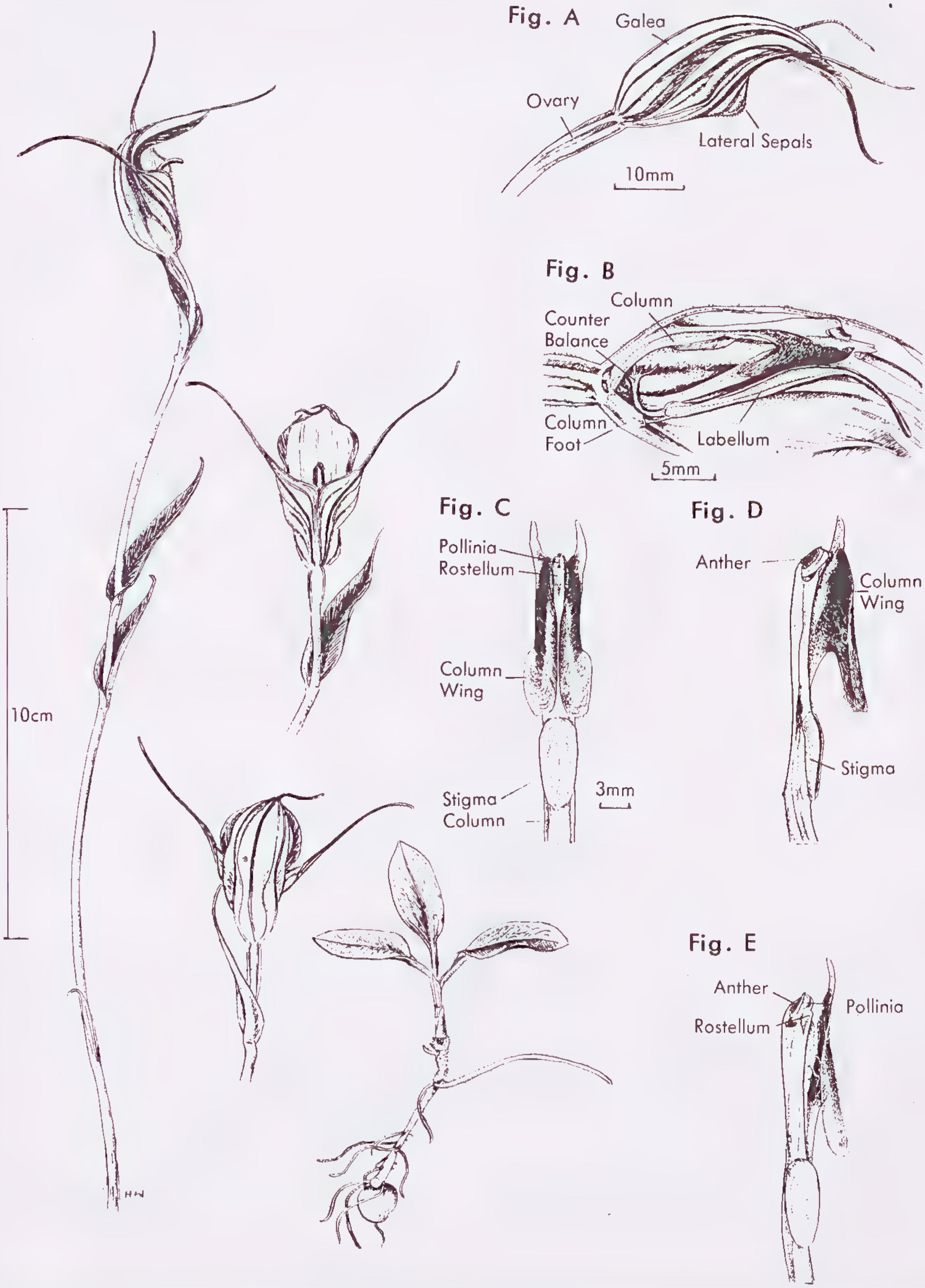
Illustration: *Painting;* Illustrated are flowering stems of *P. coccina* which bear a solitary flower. The front and rear views of the flower show the galea and the widely diverging tips of the lateral sepals. The non-flowering plant consists of a rosette of leaves connected via an underground stem to the tuberoid.
Drawing; (a) side view of the flower showing the galea, lateral sepals and ovary; (b) side view with half the lateral sepals and galea removed to show the labellum against the column, note the counter balance at the base of the labellum; (c) front view of the column showing the column wings which curl towards each other and form a tunnel, with the stigma at the base and the rostellum and pollinia at the top; (e) oblique view of the column with one column wing removed to show the pathway for the pollinator, first past the stigma and then the rostellum and anther; (f) side view of (e).

Description: Tony Slater, 159A Raleigh Street, Thornbury, Vic. 3071.
Illustration and drawings: Helene Wild, 56 Civic Parade, Seaholme, Vic. 3018



Pterostylis coccina **FitzG.** from a painting by Helene Wild.

Pterostylis coccina Fitzg.



Pterostylis coccina FitzG. from a line drawing by Helene Wild.

DIRECTORY OF A.N.O.S. GROUPS AND ASSOCIATED SOCIETIES

QUEENSLAND

- **A.N.O.S. Gold Coast Group,** Hon. Secretary, PO Box 330, Ashmore City, QLD. 4214. Meetings 1.30 pm on last Sunday each month, Community Centre, Lawson Street, Southport.
- **A.N.O.S. Mackay & District Group,** Hon. Secretary, 98 Bedford Rd, Andergrove, QLD. 4740. Tel: (079) 55-1631. Meetings 8 pm on 2nd Thursday each month, Andergrove Neighbourhood Centre, Bedford Road, Mackay.
- **A.N.O.S. Townsville Group,** Hon. Secretary, PO Box 1147, Aitkenville, QLD. 4814. Tel: (077) 78-4311. Meetings 8 pm on 1st Tuesday each month, Townsville Orchid Society Hall, Pioneer Park, Ross River Road, Kirwan.
- **A.N.O.S. Wide Bay Group,** Hon. Secretary, PO Box 15, Tinana, QLD. 4650. Tel: (071) 21-5224. Meetings monthly (7.30 pm on 3rd Thursday of odd numbered months; 11 am on 4th Sunday of even numbered months), Neighbourhood Centre, Bazaar Street, Maryborough.
- **A.N.O.S. (Qld.) – Kabi Group,** Hon. Secretary, Iona Road, Beerburrum, QLD. 4517. Tel: (074) 96-0131. Meetings 7.30 pm on 2nd Tuesday each month, Nashville State High School, Barfoot Street, Nashville.
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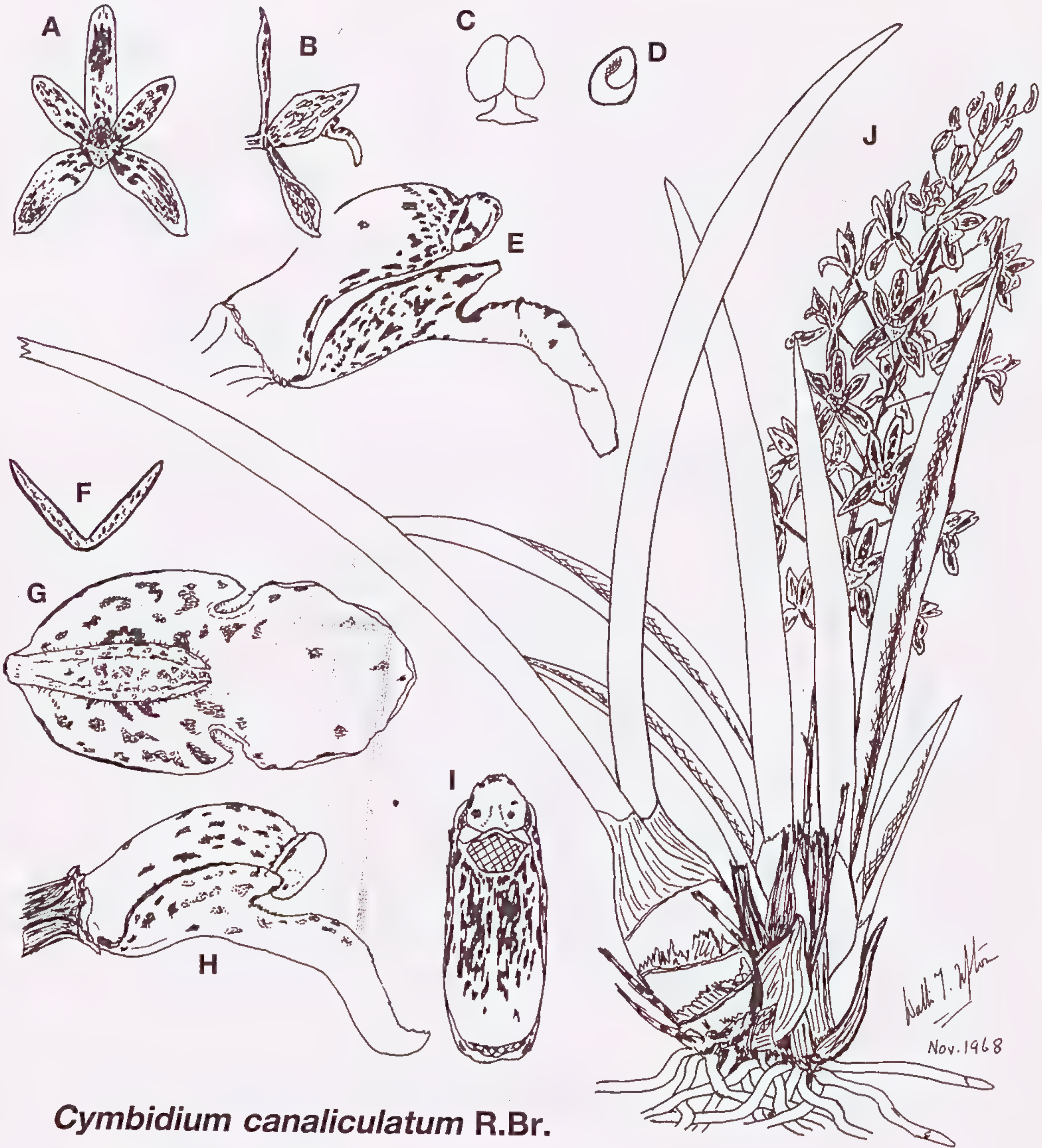

Cymbidium canaliculatum R.Br.

From near Inverell, N.S.W.

A	Flower front view 1X
B	Flower side view 1X
C	Pollinarium
D	Pollinia
E	Column and labellum side view 4X
F	Cross section of leaf 1X
G	Labellum flattened 4X
H	Column and labellum side view, note unusual upturned tip of midlobe 4X
I	Column front view 4X
J	Plant .3X

Cymbidium canaliculatum from a line drawing by W. T. Upton.

The Orchadian

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TALKING POINT

Wow!! Did I really offer to become the editor of *The Orchadian?* My reason, be assured, was not because I have nothing else to do. Quite the reverse! It was because of my concern for our society and our native orchids. The recent system of producing *The Orchadian* was not working, the geographic distance between editor and production committee was too great, causing endless problems and great frustration from everyone's point of view. We had an excellent editor who was not part of the centre of the action and maybe we did not keep him sufficiently informed or up to date.

Our production committee was also widely dispersed, from far west and far north of the Sydney area as well as to the east, making getting together a big problem, particularly as we were working people. Nevertheless this committee had much expertise.

It will not be easy to keep up the high standard achieved. In future *The Orchadian* will be produced on the Central Coast of New South Wales — editing, production, printing and despatch. The Central Coast Group of A.N.O.S. has many capable and caring members who value our native orchids and are prepared to work hard to promote them. We all live in the area and meetings can be called at very short notice. It will be printed by the Gosford Printing Co. Ltd. and all colour plates will be produced in Australia not overseas.

I must express my great appreciation to Dr Noel J. Grundon for his obvious hard work and expert manner in which he approached the job as Editor. From his many innovative improvements and new features, we have all benefitted. Noel has already offered his continued support, outlining many ideas for future articles he intends to write. Thanks Noel, for a job well done.

Incidently what does a change in editorship mean to you? Frankly, at this point in time, very little; it is not my intention to change our journal.

When we founded our Society in 1963, the first issue of *The Orchadian* was a 12 page foolscap size, duplicated journal, completely typed by our first editor Murray Corrigan and collated in Eric Gordon's factory walking round and round his work benches as we put it together. We have come a long way since then. Over the last 29 years *The Orchadian* has progressed through five editors to become a top journal, now of up to 48 pages with much colour. The previous editors were:–

M. J. G. Corrigan — Vol. 1, No. 1 August, 1963 to Vol. 5, No. 9 September, 1977.
J. J. Betts — Vol. 5, No. 10 December, 1977 to Vol. 7, No. 12 June, 1984.
Margaret Spence and Michael Penberthy — Vol. 8, No. 1 September, 1984 to Vol. 8, No. 12 June, 1987.
M. J. G. Corrigan and W. T. Upton acting editors — Vol. 9, No. 1 September, 1987.
Dr N. J. Grundon — Vol. 9, No. 2 December, 1987 to Vol. 10, No. 8 Winter, 1992.

Growing pride and awareness of native orchids is most important for our national well-being and for the preservation of our precious gems. *The Orchadian* is in the forefront of this action and through this journal we can bring knowledge and greater public awareness of the joy of growing native orchids, thus making sure that the generations to come will be able to enjoy them. This cannot be achieved by the editor and his small band of helpers, but by the united effort of us all. There is a great wealth of knowledge to be gleaned from our members and friends. You can all write of your experiences with our native orchids, how you grow them, where you saw them, what happened at your group meeting, orchid personalities, the subject matter is enormous. Do not be embarrassed to put your views, etc., in print, if you have not got a typewriter, I will type it for you. The most important thing is we need to hear from you. One small article from you, may save one of our many endangered species. Please help us continue to improve *The Orchadian* making it even more interesting, ONLY YOU CAN DO IT.

Walter T. Upton

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CHROMOSOME ANALYSIS OF SOME *DENDROBIUM KINGIANUM* USED IN BREEDING PROGRAMMES

Peter B. Adams
Botany School
University of Melbourne

SUMMARY

Chromosome counts of *Dendrobium kingianum* indicate that some well known breeding lines have used plants of different ploidies and that differences in chromosome numbers are likely to explain why certain outcrossings and selfings have been unsuccessful, while others produce viable seed. The major "red" breeding line of the Hastings Kingianum Growers Group has used outcrossing of triploid plants (3N = 57) from the Gloucester area for the most part and selfings of these are usually unsuccessful. Most of the plants used for breeding pinks, whites and silcockii types are diploid (2N = 38) and some of these may be successfully selfed. Floral quality and various vegetative and plant characteristics do not correlate well with different chromosome counts. Some of the most attractive floral forms in all colour categories are diploid plants.

INTRODUCTION

Dendrobium kingianum has a number of chromosome races, with most plants having a diploid number (2N = 38), like many other dendrobiums (K. Jones, 1967). Triploids occasionally occur in some areas such as the Gloucester-Manning and Coffs Harbour areas of New South Wales (Maxwell, 1967). Tetrapolids (4N = 76) are rare and the frequency of plants with different chromosome counts in different parts of the distribution range is poorly understood. Breeding lines for colour have been developing over the past twenty years, the best known and most advanced being the "red" line initiated by the Hastings Kingianum Growers Group (HKGG) in the 1970s. It is now in the fourth and fifth generation of seedlings. This study of chromosome counts of some of the plants used in breeding lines was initiated by an observation by the HKGG that plants in the red line could not be selfed and would not cross with some of the well known quality pink and lavender kingianums. An explanation was sought for these findings to assist the breeders in further development of the breeding lines.

METHODS

A standard procedure for preparing root squash preparations of growing root tips for chromosome counting, using 1% iron-acetocarmine staining was used following the outline given by Margaret Blackwood (1956). The roots were incubated in 1M HC1 for eight minutes at 55°C to soften the root tissue prior to staining.

RESULTS

Chromosome Counts

Most naturally occurring *D. kingianum* plants of the distribution range are diploid and occur in all areas sampled (Table 1). There is an over-representation of triploids (3N = 57) in Table 2 in this study, as plants of a triploid line were deliberately selected. Much of the breeding, especially of white, pink and silcockii coloured *D. kingianum* forms have used diploid plants. Triploids may occur in various areas, and were confirmed to be relatively common in the Gloucester-Manning areas of New South Wales and to include plants used in pink and red breeding lines.

Table 1: *Dendrobium kingianum* with diploid chromosome number (2N = 38)

Name/ Identification No.	Colour	Region of Origin	Use in Breeding
Alba LA162	white	Sth Qld	—
Albert West LA140	pink	?	+
Alwyn LA457	pink	Gloucester	+
Betty LA891	splashred	?	+
Birdwood LA776	white	Hastings	+
Dwarf White LA143	white	Hastings	+
Firebeard LA1818	red	Manning	+
Gloucester Pink AF19	pink	Gloucester	+
(Gloucester x self) LA229	pink	manmade	+
Gloucester Red KWR	red	Gloucester	+
Herbie's Mtn. AF38	mauve splash	Gloucester	+
Hirsch's silcockii AF56	silcockii	Sth Qld	+
Inferno	red	Hastings	+
Jack Penny LA329	pink	Hastings	+
Keith Preston KWR	splashred	Dorrigo	+
Lipstick LA296	splashred	Dorrigo	+
Middle Brother AF76	silcockii	Hastings	+
Minisil LA189	silcockii	Nth NSW	—
Phoebe LA333	pink	manmade	+
Red LA657	red	Gloucester	—
Red Gum LA1351	red	Hastings	+
Russell's Red KWR	red	Dorrigo	+
Tunstead's Pink AF	pink	Hastings	+

Seedlings of red/red splash line	
(Allison x Inferno) LA1854	—
(Allison x Inferno) LA1855	—
(Keith Preston x Russell's Red) LA269	—
(Keith Preston x Russell's Red) LA221	—
(Karl Marx x Firebeard) LA1380	—
(Karl Marx x Firebeard) LA1386	—
(Lipstick x self) LA257	—
(Lipstick x Karl Marx) LA1410	—
(Gloucester Red x Russell's Red) LA221	—
(Red Gum x Karl Marx) LA1219	—
(Red Gum x Karl Marx) LA1236	—

The red breeding line initiated and developed by HKGG using natural Gloucester plants (Flanagan, 1992) is a triploid line, with the seedlings testing triploid, indicating a stable chromosome number in the progeny tested so far. Tetraploids are rare and few have been used in line breeding of *D. kingianum*.

Correlations of Chromosome Counts with Plant Habit and Floral Colour

Chromosome number did not correlate in any recognizable way with plant habit, cane lengths, production of aerial growths, leaf size or shape, colour forms, or any other characteristic. Furthermore, robustness of plants or flowers did not correlate with higher ploidy as in some other orchid groups. Some of the most robust plants, for example "Hirsch's silcockii", "Albert West", "AF19" and "Big Gloucester Pink", are all diploids while some of the smallest growing miniature plants, for example "Dwarf White" and "Silcockii LA189" are also diploids. Most high quality flowers with heavy texture, large size and open upright presentation are diploids. When flowers of poorer quality are considered, for example those in Tables 1 and 2 which have not been used in breeding, both diploid and triploid chromosome numbers are found.

Chromosome Counts and Some Findings from the Red Breeding Programme

Triploid plants of the HKGG red breeding line (Figure 1) breed freely with one another in various outcrossings up to and including the fourth generation (Table 2). Selfings of plants in the line have proven to be unsuccessful in almost all cases using plants in a variety of climatic conditions in New South Wales, Victoria and southern Queensland. "Corrigan's Red", a non-Gloucester plant that is not in the main red breeding line, is one triploid that has been successfully selfed by several breeders, with seedlings available commercially. The progeny tend to resemble the parent, with improvement in flower quality and number. A brief outline of the outcome of crossing various triploid plants in the HKGG red breeding line is presented in Table 2.

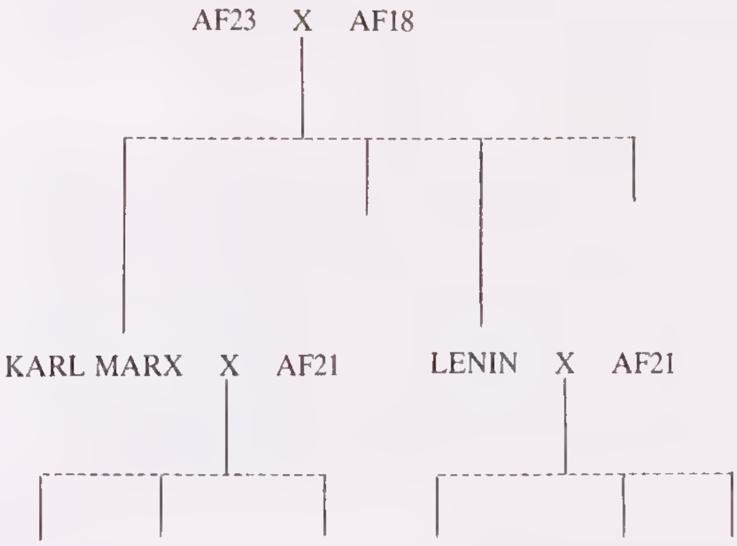

Figure 1. Summary of first two generations of breeding "Red" *D. kingianum* by Hastings Kingianum Growers Group.

Table 2: *Dendrobium kingianum* with triploid chromosome number (3N = 57)

Name/ Identification No.	Colour	Region of Origin	Use in Breeding
75 Champion AF22	pink	Gloucester	+
Bald Knob LA153	pink	Gloucester	+
Centre Leaf AF24	pink	Gloucester	+
Corrigan's Red LA240	splashred	Sth Qld	+
Cyclamen LA439	pink	Gloucester	+
Grafton LA244	pink	Nth NSW	+
Sheryl's Pink LA373	pink	Gloucester	+
Wal Upton No. 10	pink	Gloucester	+
Plants involved in red breeding line (HKGG)			
AF18 LA661	mauve	Gloucester	+
AF48 LA664	red	Gloucester	+
AF23 LA151	red	Gloucester	+
Ha Ha	red	Gloucester	+
K66	red	Gloucester	+
Advance	red	seedling	+
(Lenin x 21) LA1094	red	seedling	+
(Karl Marx x 21) LA1309	red	seedling	—
(Karl Marx x 21) LA1418	red	seedling	—
(Una x Louise) LA1692	red	seedling	—
(AF21 x *KM) LA1266	red	seedling	—
AF21 x AF23 IIK	pink	seedling	—
AF21 x AF21 IIK	pink	seedling	—
AF23 x AF18 seedling	red	seedling	—
(K66 x Karl Marx) LA1283	red	seedling	—
Karl Marx	red	seedling	+
(*KM x 21) x (KM x21)	red	seedling	—

*KM = Karl Marx

The results of attempts to breed with plants of known chromosome number are described, commenting on production of viable seed, plant form and flower colour.

DISCUSSION

Most *D. kingianum* breeding lines have used a trial and error approach, repeating unsuccessful attempts in subsequent seasons. The catalogues of commercial breeders list only the results of compatible crosses and negative results are rarely described and often repeated. Chromosome counting is not essential for designing a breeding line, but it can assist in understanding the results and to explain some repeated failures to obtain viable seed. Chromosome analysis indicates that breeding falls into two main categories, diploid and triploid lines.

Diploid Breeding Lines

Diploid plants of *D. kingianum* usually outcross with other diploids and there have been many examples in the catalogues of breeders, such as "Tunstead's Pink" x "Middle Brother Silcockii", "Lipstick" x "Tunstead's Pink" and many other pink crossings. Some parents with diploid chromosome number will not breed, indicating that other factors in the interaction between pollen and stigma/style or ovule are important in determining compatibility. A minority of *D. kingianum* plants are self compatible (Adams, 1990) and most of these are diploid. A well known example is "Lipstick". Others, like "Tunstead's Pink" have defied attempts to self, except on very rare occasions, when a small number of seedlings are claimed to have been produced.

Triploid Lines

Chromosome counting has been most useful with triploid lines and was used by the pioneering HKGG in developing the red breeding line of *D. kingianum.* Analyses explained the failure of plants to self and identified triploid plants which could be used in the programme. All counts to date with plants from the line indicate that the seedlings maintain triploid constancy.

The outcomes in terms of floral colour and quality (Table 3) were not predicted by considering the characteristics of the parents. The reddest and highest quality seedling came from "AF23" x "AF18", a cross of red and pink coloured flowers. The crossing of red flowers with red flowers, "AF23" x "AF21" was disappointing, with poorer quality and fewer deep red colours, despite superior quality of floral form and deeper red colour in the parents. With sibling and back crosses in later generations, for example, "Karl Marx" x "AF21", "Lenin" x "AF21" and ("Karl Marx" x "AF21") x ("Karl Marx" x "AF21"), the percentage of quality and purple flowering plants has increased to a high level. Other crosses identified as triploids are "Cyclamen" x "Karl Marx" and "Grafton" x "Ha Ha".

Table 3: Outcome of some crosses in the red *Dendrobium kingianum* breeding line

D. kingianum cross*	Outcome (seedlings)
AF23 X AF18	Range of quality and colour from mid pink to deep red.
AF23 X AF21	Mainly mid pinks, poorer quality flowers. Plenty of viable seed.
AF23 X AF22	Little or no viable seed produced. No flowering results available.
Karl Marx X AF21	Quality flowers with variable but high percentage of deep red. Plenty of viable seed.
Lenin X AF21	Variable percentage of quality flowers, with colour mostly deep red.
(Karl Marx x AF21) X (Karl Marx x AF21)	Plenty of viable seed. Flowering results not yet available.
(Karl Marx x 21) X Karl Marx	High percentage (80%) of deep red quality flowers.
K66 X Karl Marx	Plenty of viable seed. High % of deep red. Good grower.
Red Gum X Karl Marx	Plenty of viable seed. High % of deep red; flower count low.
AF48 X Karl Marx	Plenty of viable seed. High % of deep red; strong spikes.
Karl Marx X Firebeard	Poor quality pinks. Very few with red lips.

*AF18 is a deep pink flowered natural
AF21 is a red flowered natural
AF22 is a mid pink flowered natural
AF23 is a red flowered natural
AF48 is a red flowered natural
K66 is a red flowered natural
Karl Marx and Lenin are red flowered seedlings from the first generation of "red" breeding
Red Gum is a red flowered natural

Triploidy is fairly common in plants and in general, triploids are highly infertile and not capable of sexual reproduction due to irregularities in cell division (meiosis) which leads to formation of pollen and ovules. Triploids may be fertile if there is a mechanism to allow haploids ($N = 19$) and diploid gametes to be formed in relatively high numbers during meiosis (Gottschalk, 1976). This unusual situation occurs in triploid *D. kingianum* in the red series and large numbers of seedlings have resulted from some 3N x 3N crosses. Triploidy may be perpetuated by regular formation of bivalent sets of chromosomes, as seen in some grasses, e.g. *Pennisetum ruppellii* Steud. and poppies, *Papaver somniferum* Linn. (Kadereit, 1991).

Higher Chromosome Numbers

Plants of tetraploid or higher ploidies (Jones, 1967) have not been significantly used in breeding. They are rare and are recorded in my series of chromosome analyses at a frequency of less than one in two hundred.

Breeding Using Plants with Different Chromosome Numbers

The commonest example of successful chromosome mismatching are crosses using parents with 2N and 3N ploidy, which occasionally may produce viable seed, but in many cases will not produce seed. The seedlings which result from such a cross could be of very variable chromosome constitution and quality and are likely to have reduced fertility.

Chromosome analyses of seedlings confirmed that crosses such as Red Gum (2N) x Karl Marx (3N), Lipstick (2N) x Karl Marx (3N), Corrigan's Red (3N) x Betty (2N) and Allison (3N) x Inferno (2N) are examples of this type of breeding. Reasonably high numbers of seeds have resulted from these crosses and flowering results have been very favourable (Table 3). Preliminary observations of attempts to breed further with the seedlings of 2N x 3N suggests a decreased fertility. I suspect that some other 2N x 3N crosses have been tried and have been unsuccessful, as in our own programme. Unfortunately, negative or unsuccessful results tend not to be recorded and discussed in accounts of breeding. Success in the crossing of 2N x 3N was unexpected and the production of high numbers of 2N seedlings from the cross using a 3N plant as both pollen and pod parent means that the triploid parent forms significant numbers of haploid (N) pollen and ovules, as discussed by Kadereit (1991). If pollinations have been carried out strictly as listed in catalogues, there may well be a small number of other successful crosses of 2N x 3N that could be investigated by chromosome counting. There is also a possibility that some crosses are not as listed in catalogues, due to the unwanted deposition of pollination by visiting bees, or labelling errors.

The Role of Chromosome Anbalysis in Breeding

Chromosome analysis may be useful in planning and developing particular breeding lines in species such as *D. kingianum* which have a number of chromosomal races. It is important to realize that incompatibility between plants, low fertility and failure of individual plants to breed depend on many factors apart from chromosome numbers. Most of these are poorly understood and involve chemical and physical factors in the pollen, stigma and column of orchid flowers. Many manipulations have been attempted to overcome compatibility barriers, including modifying the environment, selecting terminal flowers, using flowers of different ages at different times of the day or night, soaking pollen in stigmatic fluid and treating it with chemicals, vitamins or hormones.

Chromosome counting in *D. kingianum,* which has very small chromosomes, is a technically difficult procedure requiring high resolution microscopy and cannot be performed readily by orchid breeders. It has a place in assisting the breeder requiring detailed knowledge of particular plants and breeding lines and is just one of a number of specialized tests used by pollination biologists in the study of plant fertility.

ACKNOWLEDGMENTS

I thank Alwyn Flanagan, Rod Graham, Sheryl Lawson, Alan Garrett, Harry Klose, Ted and Barbara Gregory for helpful discussions about breeding strategies and origins of plants. Wal Upton and Michael Harrison provided additional plant material for analysis.

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Dr Peter Adams article was referreed by Keith Maxwell M.Sc.Agr., his report is printed in full.

Ever since *Dendrobium kingianum* was described by Lindley in 1844, it has been of particular interest because of its variability and attractive flowers.

My research, from 1965-68, using 280 clones, mainly collected in the field, concluded that there appeared to be no definite correlation between flower size, colour and chromosome number. I also came to the conclusion that the triploids examined probably resulted in the field by direct crossing between diploids and tetraploids.

It was a pleasure to have had the opportunity to read this report of the rather comprehensive breeding work of Peter Adams.

By making a cytological survey, mainly chromosome count, one is able to partly explain and perhaps forecast, why certain outcrossings and selfings have been unsuccessful.

Despite popular opinion that chromosome counting is not essential for designing a plant breeding line, the results of this work reinforces the view of those that consider it is most desirable and time saving.

Congratulations — this type of breeding programme should be encouraged and perhaps it may be possible to include, in any future project with *D. kingianum* a few clones that produce scented flowers?

DENDROBIUM KINGIANUM — ORIGINS OF THE "RED" BREEDING PROGRAMME & SEARCH FOR THE ULTIMATE RED

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SUMMARY

The origins of the "red" flowering *Dendrobium kingianum* breeding programme, including the initial crossings of selected Gloucester plants are outlined. The programme represents 20 years of work by the Hastings Kingianum Growers Group (HKGG). Seedlings from the second generation are now grown widely throughout Australia and have been used in further breeding by HKGG and many other *Dendrobium* breeders.

The search for the ultimate "red" *D. kingianum* began in the spring of 1972 when my brother-in-law, Keith Weismantel and I accidentally wandered into a previously untouched patch of *D. kingianum* on the Gloucester Bucketts, New South Wales. As well as some really fine pink forms we collected two of the darkest "reds" we had ever seen to that date. One of these was the now well known kingianum "Ha Ha" and the other was "AF23" or "Red No. 2" as it is sometimes called. Another trip a few years later yielded plants we named "AF48" and "K66", two more fine reds.

At that stage of my life I regularly visited Bill and Jean Cannons, then operating Wayside Nursery in Port Macquarie. They showed me the species Cattleyas and soft cane Dendrobiums, modern showbench plants from which their much bigger improved flowers were bred. The question was asked "Why can't we do that with kingies?" Bill replied: "We're too old to start something like that. It needs a young man like you with his life ahead of him". So the germ of an idea was sown.

After long discussions over a Tooheys or two with Harry Klose, another native enthusiast, we decided to try selfing "Ha Ha", at that time condisdered to be the best red kingianum around. Eventually a pod did form after many failures and I don't know to this day if it was really a selfing, or whether an insect helped us by performing an outcross, as all later attempts to self "Ha Ha" have been unsuccessful. Anyway the seed was flasked and a few dozen seedling planted out by both Harry and myself. Some of our early results and breeding ideas were described by Harry at the Sixth New South Wales Regional Conference held by Hastings River Orchid Society at Wauchope in 1981 (Klose, 1981).

The first generations of the programme are set out in Table 1 and the following are the main plants used so far:

AF23	A small plant growing on an exposed rock face when collected. It is an attractive upright growing plant when grown into a specimen and can cover itself in large red flowers.

AF21	Also called "Ha Ha", this is by far the darkest of the natural kingianums, but has an untidy rambling growth habit. The canes can reach 250mm long on a well grown plant and are marked with reddish brown when the plant is grown in strong light.
AF48	Collected from a cliff face near the site where "AF21" was found. It has well shaped red flowers on an upright raceme and has grown slowly into an attractive specimen.
AF18	This plant came from a different part of the Bucketts and is the most robust of all the plants used in the programme. A well grown plant can resemble a small *D. x delicatum* in size and has large mauve flowers.
K66	This plant came from the same general area as "AF18" and has proved to be a fine parent. The flowers are not as dark as some of the others used, but are of good shape and substance and the raceme stands upright — a very important factor for a breeding plant.
Karl Marx (Plate 1.)	This seedling is the best of the original "AF23" X "AF18" cross. It can have up to twelve flowers on a raceme. They have been measured as 35mm across the sepals. When crossed with a number of other clones, "Karl Marx" has produced some of the best red kingianums seen in recent years.
Lenin	This is also a seedling from the "AF23" X "AF18" cross. Little is known about "Lenin", as it died as a small plant. However it was considered good enough to use as a young seedling and was crossed with "AF21".
AF21 X Lenin	Not many plants were raised from this cross, as they proved very difficult to grow. As well as being slow growers they were equally slow to flower and ten years later a few have still not flowered in five inch pots. There are some very dark flowering plants, worthy of a place in any collection.
Little Lenin	This seedling is from the "AF21" X "Lenin" cross, which did flower as a young plant. It has very dark red flowers of good shape and texture. Flower count is rather low and the plant is slow growing like most of its seedlings. Oddly enough it has produced vigorous seedlings when crossed into the "Karl Marx" line later in the programme.

The first seedlings were slow to grow and even slower to flower. When they did flower none were as dark as "Ha Ha" and most were poor forms. Only one has been retained and this is a really fine plant — not as red as the flowers of the parent, but a big robust grower with an exceptionally strong raceme and large well-shaped flowers. This plant has been named "Advance 1".

While the "Ha Ha" selfing were on the way, two other crosses were tried, "AF23" X "Corrigan's Red" and "AF23" X AF18", a big mauve from another part of the Bucketts.

When these plants finally flowered, the seedlings between "AF23" (pod parent) and "AF18" were by far the best (Figure 2). Some outstanding seedlings were named and retained for breeding. Best of all was "Karl Marx" and it has dominated our breeding programme to this day.

Among the first to flower were "Karl Marx" and "Lenin", so these were both mated back with "Ha Ha". The seedlings of the "Lenin" cross were slow to grow and flower, but some were very dark and most had good habit of raceme. The most successful results were from the "Karl Marx" cross and it is gratifying to note that some of the best of this cross have been the basis of an excellent "red" kingianum breeding programme in several large commerical nurseries.

At this stage, two more local growers, Alan Garrett and Rod Graham joined our group. As small hobby growers we could only find room for a flask or two each, but combining we were able to grow and flower a reasonable number of plants from each cross, so broadening the pool.

A few straight sibling crosses were tried without much success. Some were infertile and others gave very poor germination. The few plants which did survive were very hard to grow and slow to flower. "Karl Marx" was also crossed with "AF48" and "K66". These grew like weeds and most have good red colour with good racemes. We also made many attempts to self the good red

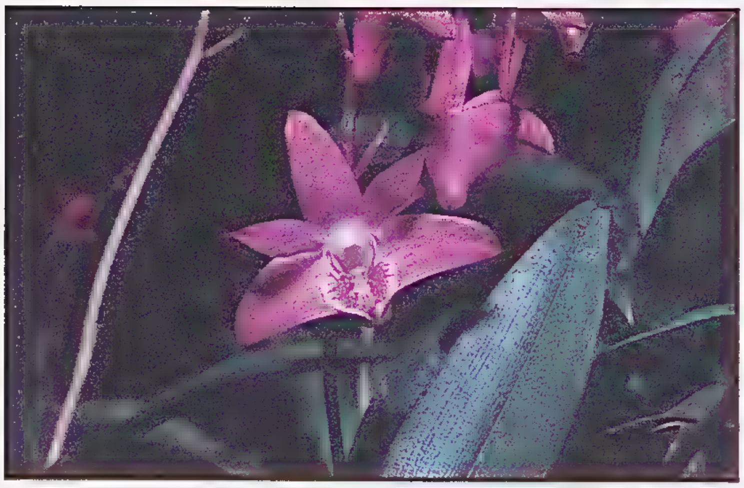

Plate 1: *Dendrobium kingianum* 'Karl Marx'.
Photo P. Adams.

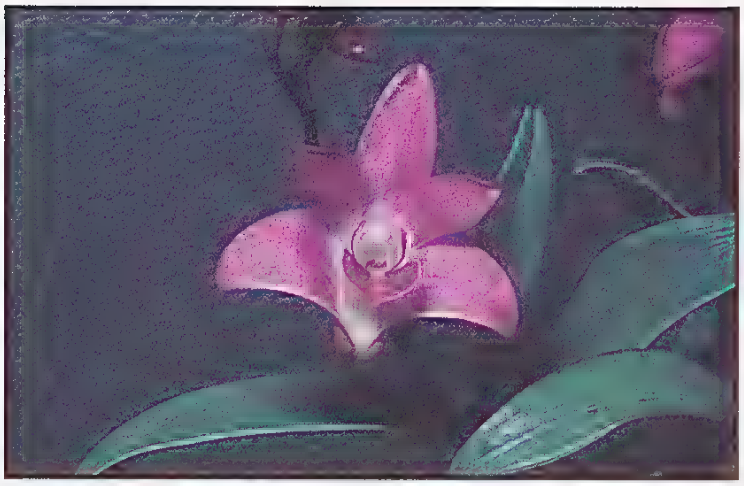

Plate 2: *Dendrobium kingianum* 'Blacky No. 1'. A seedling of (Ha Ha x Lenin) X (AF48 x Karl Marx).
Photo P. Adams.

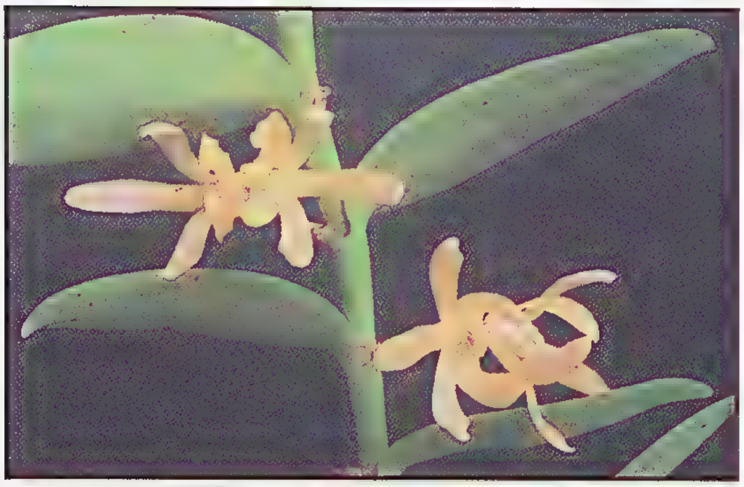

Plate 3: *Dendrobium luteocilium.*
Photo W. T. Upton.

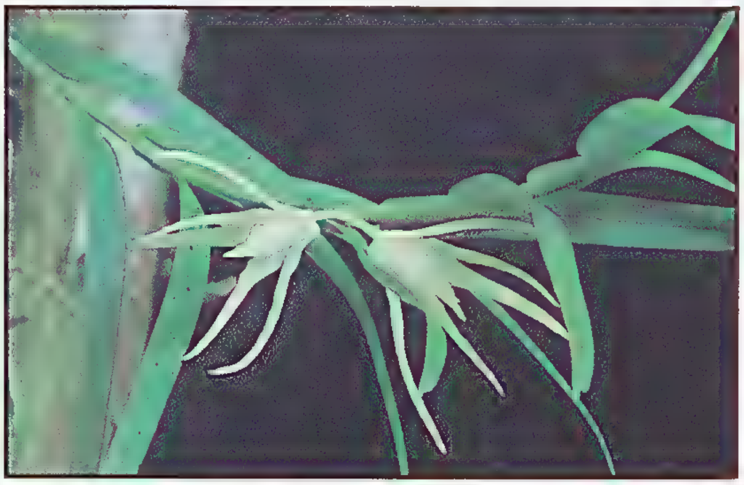

Plate 4: *Dendrobium tozerensis.*
Photo W. T. Upton.

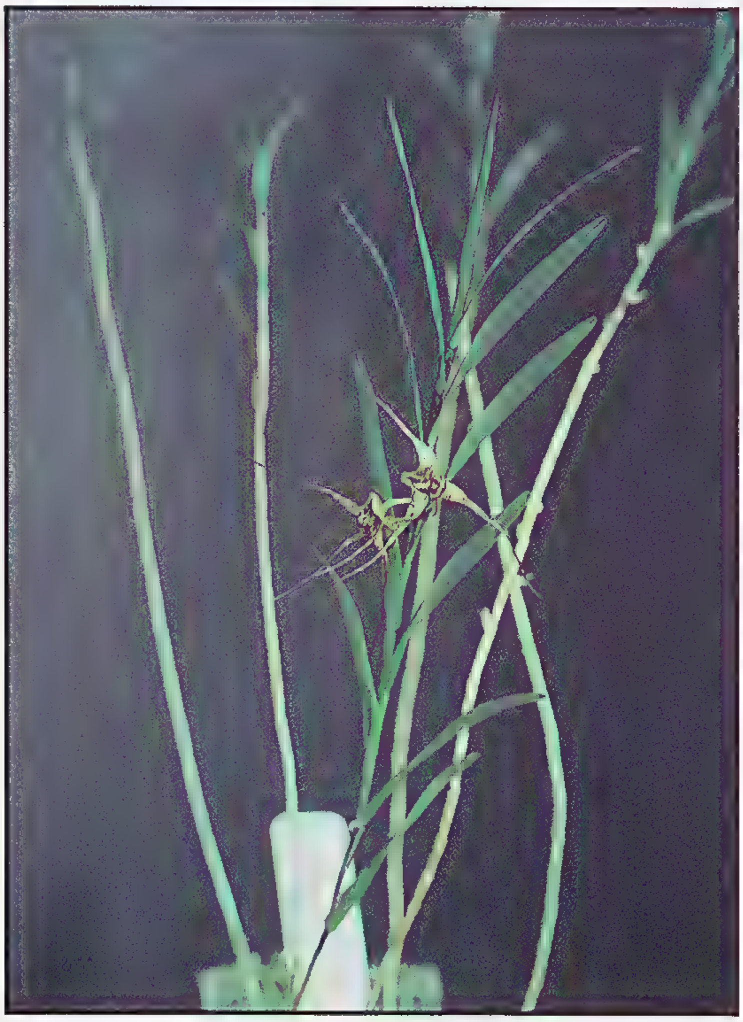

Plate 5: *Dendrobium baileyi.*
Photo W. T. Upton.

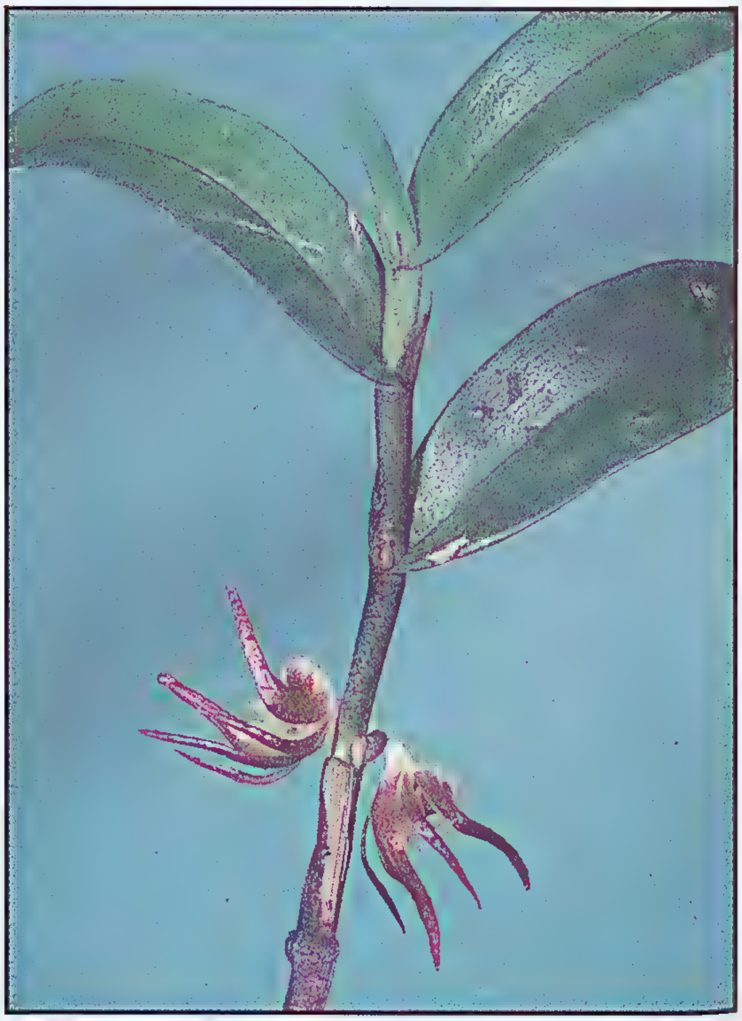

Plate 6: *Dendrobium cancroides.*
Photo The late E. Gordon.

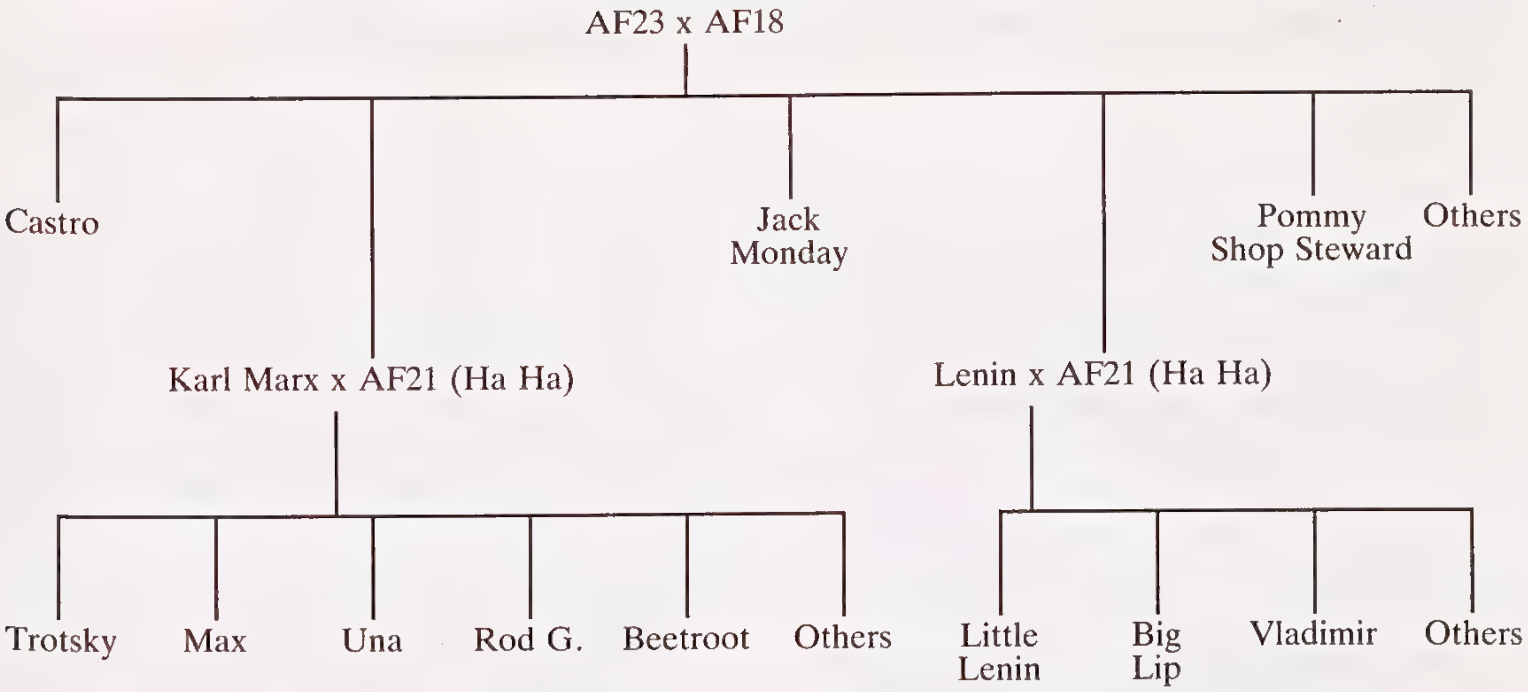

Figure 2. The first two generations of breeding "red" *D. kingianum* by H.K.G.G.

parents and seedlings, hoping to collect up the genes for strong colour, but could not obtain seed.

At this stage of the story perhaps I should explain my idea of the ultimate "red". My ultimate red will have sixteen well shaped flowers per spike, deep plum or beetroot colour all over, 40mm across with a raceme capable of holding flowers of this size erect. I believe this goal is quite realistic and achievable as there are already a few line-bred light-coloured clones nearing this size and number of flowers.

The "Lenin" X "Ha Ha" plants were not used in the programme at first because of their reluctance to grow well. With hindsight this appears to have been a mistake as several that were used later produced vigorous seedlings. One was ("Lenin" X "Ha Ha") X ("AF48" x "Karl Marx") (Plate 2) and this has been a spectacular success. The plants were nearly pushing the lids off their flasks when they came back from the laboratory and haven't stopped growing since. A few flowered two years out of flask. One of these, flowered by Rod Graham, is without doubt the best "red" kingianum we have ever produced. The flowers are the deepest plum colour all over including the labellum, 30mm across and good shape and the raceme points straight to the sky. At an early stage it produced eight flowers per raceme on a plant in a two inch pot. Rodney's chest swelled at least four inches when the buds opened. This clone has been christened "Blacky No. 2" and already has been used with the best of the other lines. Seedlings bred from the best of the original "Ha Ha" X "Karl Marx" cross have also flowered and some of these show great potential.

Dr Peter Adams assisted us in the middle stages of the programme with chromosome analysis which showed that all of our original wild plants in the line were triploid (Adams, 1992), perhaps explaining the reluctance of our plants to accept self pollen. I still self pollinate a few plants every year hoping for a chance success, but to date no seed pods have resulted.

With many clones to choose from and trial and error, it has been possible to make sibling crosses which grow well. Most of these are still a year or two off flowering.

Those plants collected on the Bucketts in 1972 are now great specimens in 20 inch pots and I will always keep them for old times sake. So far the ultimate red hasn't appeared, but who knows what another generation or two will achieve. Perhaps it is in one of those pods sown last summer . . .

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DENDROBIUM KINGIANUM OR IT'S A SMALL WORLD

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In 1831 Charles Darwin at the age of 24 joined Captain FitzRoy then 26, on the ship "*Beagle*", to set off to chart the shores of South America. The midshipman was 14-year-old Philip King, whose father, Captain King, son of Governor King, had commanded the first survey. Captain King had gathered a great number of specimens of a wide variety of animals from Patagonia during his survey and he instructed Darwin on the "use of arsenical soap and preserving powder" to preserve his collections.

Time passed and in 1836 after surveying the coast of South America up and down, east and west they left South America and finally reached Sydney on the way round the world to get home to England. Darwin visited Captain King on his 4,000 acre farm "Dunheved", 30 miles from Sydney, writing his own account of his South American voyage. The Captain had an extensive collection of specimens and shared an interest in barnacles and molluscs with Darwin. Young Philip rejoined his family after being away for 10 years.

In 1839 John Bidwill discovered a small pink flowered *Dendrobium* on The Bucketts, west of Gloucester in New South Wales. This he described in Edwards Botanical Register in 1844 as *Dendrobium kingianum* after Captain King, a well established naturalist as well as a Royal Navy Commander who surveyed much of Australia's coast and was later a Rear Admiral.

So THAT is why one of our most popular native orchids was named after a Naval man. He was a naturalist too.

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Australasian Native Orchid Society (Victorian Group) Inc.

NATIVE ORCHID SHOW

Saturday 3rd October
11 a.m. - 6 p.m.
Sunday 4th October
9 a.m. - 4 p.m.

National Herbarium
Birdwood Avenue
South Yarra
Melway Map 58, A1
Entry by Donation

ARTICLES WANTED

Articles for publication in *The Orchadian* are always welcomed. We try to maintain a balance of articles, from those of a scientific nature reporting original research on Australasian native orchids, through naturalist-style reports, observations by hobby growers and topical reports of happenings in the Australasian orchid community.

Our readers have expressed a desire for articles on the cultivation and culture of our native orchids. A number of such articles appear in society bulletins and newsletters, but are often too narrow or specific in their coverage to appeal to the wide readership catered for by *The Orchadian*. However, such articles are the type so frequently demanded by our readership. With a small amount of expansion to cover more general or wider conditions, many of these articles would be quite suitable for publication in *The Orchadian*.

Action required: **Think about it, but not so long that enthusiasm is lost. Then write the article and submit it to the Editor or one of the Associate Editors!**

THE AUSTRALIAN DENDROBIUMS OF SECTION *GRASTIDIUM*

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Section *Grastidium* has many species, the centre of development being New Guinea, with close to 100 taxa recorded, thence spreading northward as far as India, with numbers falling as they spread. Southward the section extends into north-eastern Australia, where one New Guinea species is represented and there are three endemic species. They are all plants with long slender pseudobulbs, quite woody and wiry, completely covered by leaf sheaths. Leaves are carried along the entire length of growths, the internodes are quite long and leaves are fairly persistent, particularly toward the apex of growths. Blooms are produced, usually in pairs facing each other, from any node on the upper half of stems. In all species the blooms are fugacious, lasting at most two days — usually only one day or part thereof. Blooms are not large, with narrow segments and are quite often partially hidden by the foliage for the few hours they are open.

Nevertheless healthy plants produce flowers over a long period and when in bloom are a quite a joy to behold. The four Australian species are all easy to grow in a warm house, their only disadvantage being that if well grown, the plants may become large. All four are under threat in nature, for they are totally dependent on a rainforest environment and our rainforests are ever diminishing. Unfortunately, but understandably, the average orchid grower concentrates on plants which produce flowers with bright colours, or sweet fragrances, or which are large, or which are long lasting. The section *Grastidium* species fall outside these criteria and so are neglected by growers, even species specialists and this is sad, especially for native species growers. So what if they are no good for hybrids, so what, if their floral beauty lasts only a few hours? How long does a sunset last and who hasn't admired one of them? After all, our stated aims as growers of Australasian orchids don't exclude plants with short lived flowers of modest colour and form and we should give care and attention to all species, including the section *Grastidium* Dendrobiums.

D. baileyi (Plate 5) is the commonest Australian species, endemic to the foothills of the north-eastern ranges of north Queensland, where it used to be found along any rainforest creek between Bowen and the Endeavour River, the range of my own personal wandering. Rarely found above 200 metres, it is an epiphyte on trees with reasonable light access, usually along or close to streams. Often found sharing trees with its namesake *Bulbophyllum baileyi.* Old plants can become very large and I have seen many which would be too heavy for one man to carry. Such plants, if found on the right sunny morning, are remarkably attractive with many hundreds of widely open greenish/yellow blooms, singly or in pairs, each densely spotted with red/purple. Of course, a couply of hours later each bloom has closed, with its narrow segments curled and twisted together in an impenetrable tangle. Any pollinator caught inside the flower would have to eat his way out, for it is impossible to untangle the sepals and petals. The thin woody pseudobulbs may grow to a length of around 120cm, becoming pendulous as they grow and unlike most *Dendrobium* species, do not complete their growth in one season. Under good conditions individual growths may continue to grow for at least three years and plants can have growths in several stages of development, all but the very young blooming.

In cultivation *D. baileyi* must have some warmth in temperate or sub-tropical areas, for if temperatures drop below 12°C for any length of time the plants will die quickly, dropping all leaves and collapsing. Given warm winters they thrive in pots with a well drained but water retentive compost and respond well to a regular feeding programme of weak nutrients, preferably of organic origin. Plants fed regularly with inorganic fertilizers tend to become lush and soft, don't flower as well and seem to attract more insect predators. They like about 50% diffused light, gently moving air and really the only problem I've struck is controlling the sometimes very high temperatures enjoyed by growers in coastal N.S.W. I solved this by using low volume micro-misters in my glasshouse, turned on on very hot days and left running until sunset. All in all, a species easy to grow in a bushhouse in the tropics, or in a heated glasshouse in cooler areas. Until recently *D. baileyi* was available from licenced collectors in Queensland and given its rapid growth in good cultivation, divisions should be available for those growers interested in growing species a little out of the ordinary.

D. cancroides (Plate 6) is a much rarer plant in nature and does not grow very large, as does *D. baileyi.* Plants seem always to stay small, mainly because they do not get the great number of multiple growths needed to achieve a large size. Pseudobulbs are woody, markedly flattened and covered by the persistent leaf sheaths which are dark brownish, even when alive and very coarse to the touch, like fine sandpaper. Leaves are thin, like those of *D. baileyi,* but much broader. Leaves are not as persistent either and soon fall from the basal half of growths. Like *D. baileyi,* the growths of *D. cancroides* take more than one year to complete their growth and plants are usually pendulous, much more so than *D. baileyi*. In nature *D. cancroides* is much more restricted in its range, being found at low altitudes in eastern rainforests of north Queensland from about Tully north to the base of Cape York. I found plants a few times in the forests around El Arish, always on trees along creek banks, also in the same habitat areas, i.e. trees overhanging streams, in the Bellenden Ker Ranges around Mt Bartle Frere and I saw a few plants along creeks in the forests behind Gordonvale. Plants are not easy to find though, for the small clumps of dark growths blend into their background pretty well and I probably missed as many as I found.

Blooms also are pretty inconspicuous, appearing in pairs facing each other from any node on the upper half of growths. Inflorescence is very short and the flowers are small, about 2cm long, not widely opening and are a dark reddish/brown in colour. They are also always at least partly hidden by the leaves and even on cultivated plants can be easily missed, given they only stay open for a few hours.

Nevertheless, plants of the species are worthy of a place in one's collection, for the plants themselves are interesting with their pendulous habit, dark stems and broad shiny green leaves. Any blooms one sees might be counted as a bonus.

D. cancroides will grow under the same conditions as *D. baileyi* in cultivation, but I found they did best as mounted plants, due to their pendulous habit and grew them very well on slabs of treefern fibre kept always moist, not sodden. They never get too large for slabs, for the longest stems will only reach about 70cm and that not too often, while plants seem to lose a stem for every new one after clumps reach 15-20 stems. They seem to appreciate weak feeding, growing faster but not larger when fed regularly. Blooms may appear at any time in the tropics, but in cooler climes there is a decided absence of flowers in winter. Flowers do not have the long narrow segments of *D. baileyi* and when they close do not get the sepals and petals in a tangle — they just close.

D. luteocilium (Plate 3), as far as size goes, is the champion of our section *Grastidium* species, for where *D. baileyi* may grow too large for a man to carry, plants of *D. luteocilium* grow too large for a man to move — they can grow into remarkably large clumps, with pseudobulbs around 2 metres long. It occurs in the foothills of the eastern ranges of north Queensland from around Tully through Cape York and into New Guinea, though the natural spread of the plant was of course from New Guinea south. It is far from common, in my experience, which is strange, given that a large plant may carry many seed pods — perhaps seed viability is poor. It extends into higher altitudes than its two cousins and I found an enormous plant once, sitting on a large rock above Maria Creek near Tully, at an altitude of around 300 metres. I also saw plants close to streams behind Innisfail, on Bellenden Ker and up behind Gordonvale and Mossman further north. The species seems to be mainly an epiphyte, sitting in crotches of stout branches of rainforest trees, but lithophytic plants can be found where the light is good enough.

Pseudobulbs are much stouter than the other three species, though still slender and the leaves are also much thicker and stiffer. Leaves are more persistent, especially on the basal half of the stems and stems are commonly leafed from base to apex. This adds to the sheer bulk of large plants where stems are counted by the hundred. Blooms appear on short peduncles from leaf nodes, are usually in pairs facing each other and are about 2cm long, not opening widely. Segments are broader than in blooms of *D. baileyi, D. cancroides* or *D. tozerensis,* but are still rather narrow, the extremities bluntly pointed, not extended into long tails. Colour is usually dull yellow sometimes brighter and a large plant in full bloom is really magnificent, for each long stem can carry 100 flowers and there are hundreds of stems — I saw two such plants in twenty years of roaming the northern forests and I clearly remember them both thirty years on.

Fortunately for orchid growers, large plants take a long time to grow and a smallish clump I carved off a plant in 1940 was still a manageable size when I abandoned it and left north Queensland in 1963, so one could safely get a plant and put it in one's glasshouse without it taking the place over. *D. luteocilium* has noticeably thinner roots than the others and I found it grew well in a pot of very well drained but rather water retentive compost. In my glasshouse at Ettalong I grew a plant in a terracotta pot with compost comprising fine grade pine bark and coarse Nepean sand in 3:1 ratio, diffused shade of about 50%, gently moving air and regular weak doses of fertilizer. Plants grew

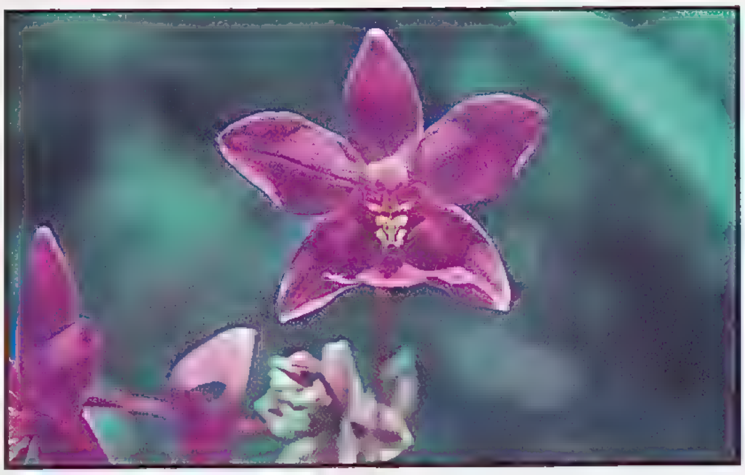


Plate 7: *Spathoglottis papuana* ex Hombrom.
Photo N. H. S. Howcroft.

Plate 8: *S. papuana* Habitat. Edge of Bluff, Hombrom.
N.B. *Bulbophyllum fletcherianum* on the rock face.
Photo N. H. S. Howcroft.

Plate 9: *S. papuana* Hombrom Bluff. Plants on the edge, in gullies and around cliff face.
Photo N. H. S. Howcroft.

Plate 10: *S. papuana* Habitat Tufi.
Photo W. Bandisch.

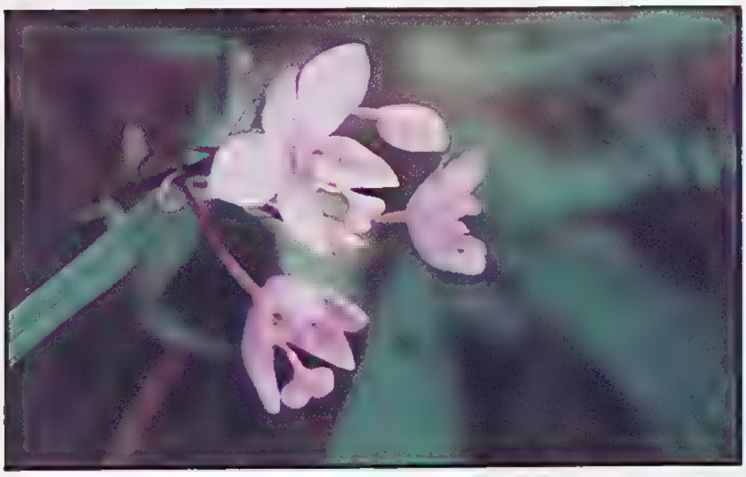


Plate 11: *S. papuana* Tufi.
Photo W. Bandisch.

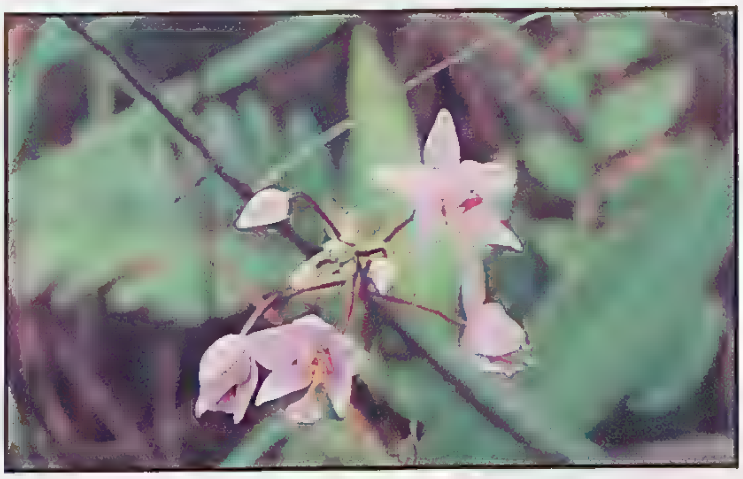


Plate 12: *S. papuana* Tufi.
Photo W. Bandisch.

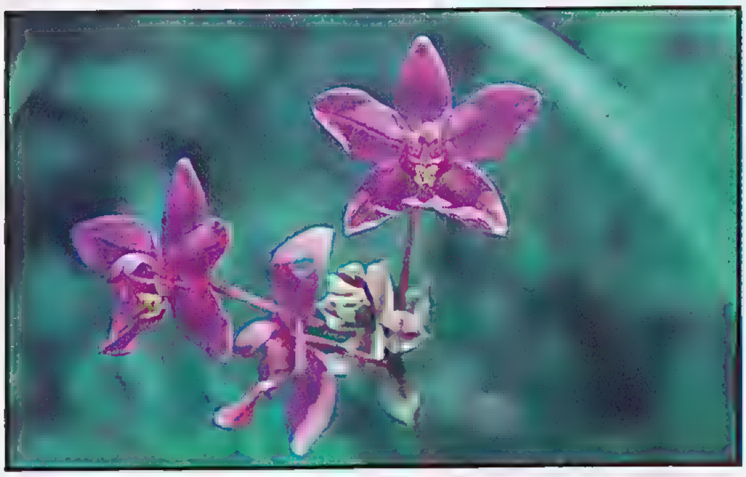


Plate 13: *S. papuana* Hombrom.
Photo N. H. S. Howcroft.

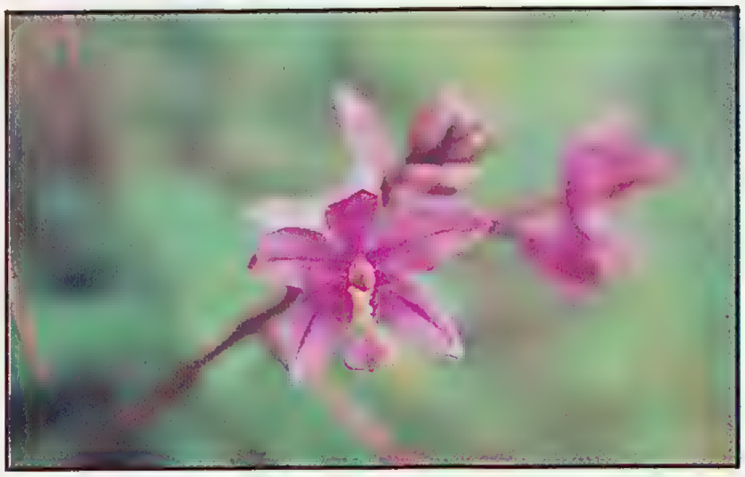


Plate 14: *S. papuana* Tufi.
Photo N. H. S. Howcroft.

well treated thus, bloomed at odd times all year except mid-winter and really turned on a show several times between late summer and early autumn (mid January to end of March). Blooms of this species are brighter in colour than *D. baileyi* or *D. cancroides* and are not masked by the leaves to the same extent as the others and this species is definitely worth growing for its floral display, as well as being a most attractive plant.

D. tozerensis (Plate 4) is the fourth species of the section *Grastidium* found in Australia. Only described and named in 1977, it has a very restricted range, being found at low altitudes on Mt Tozer and the McIlwraith Ranges of far north Queensland. I have not seen this species growing in the forest, but it is reported to be mainly lithophytic in habit, favouring large rocks or cliff faces and is relatively rarely found growing as an epiphyte on rainforest trees. Like its cousins *D. tozerensis* enjoys high humidity and is usually found close to streams. It is reported as growing into large clumps of hundreds of stems. Pseudobulbs are thin and woody, up to 60cm long and about 2mm in diameter. Leaves are long and narrow, like those of *D. baileyi,* but much stiffer than the leaves of *D. baileyi.* Stems are leafy from near the base and the dark green leaves are quite persistent, making an attractive plant. Because of their relatively short length, stems tend to stay upright and smallish plants are much neater in appearance than those of *D. baileyi,* with which *D. tozerensis* is closely related. Blooms are produced from any node on the upper two thirds of more mature stems and may appear at almost anytime of the year. I only ever grew three clones of this species and found their heaviest blooming was from mid summer to early autumn, when the longest pseudobulbs would produce 30-40 blooms on a single day. Flowers are produced in typical *Grastidium* pairs, but unlike its cousins, the flowers of *D. tozerensis* do not gaze adoringly at each other, but turn their backs on each other and gaze into space instead.

They are only open for a few hours while the sun is high so the gazing they do is not very drawn out any way. Blooms are about 30mm across, open widely with the segments narrow and finely pointed — but not drawn out into long tails like *D. baileyi* — and are pure white. I found plants very rapid growers and grew them in terracotta pots with a fairly water retentive compost with very good drainage. They are truly topical and require at least 12°C minimum in winter about 50% shade and gently moving air. I fed regularly with fertilizers very weak and found plants had three distinct growth bursts, with new growths appearing around the middle of September, late November or early December and again in late March. The March growth was not as rapid through the winter. Individual growths continue to grow for more than one year, but will commence blooming when about half grown. Because the blooms are widely opening, face outward most times and are pure white in colour, *D. tozerensis* is a most attractive plant when in bloom and if one adds up the total days plants are in bloom throughout the year, they have flowers in quantity for about ten to fourteen days and I reckon that is enough to make them desirable.

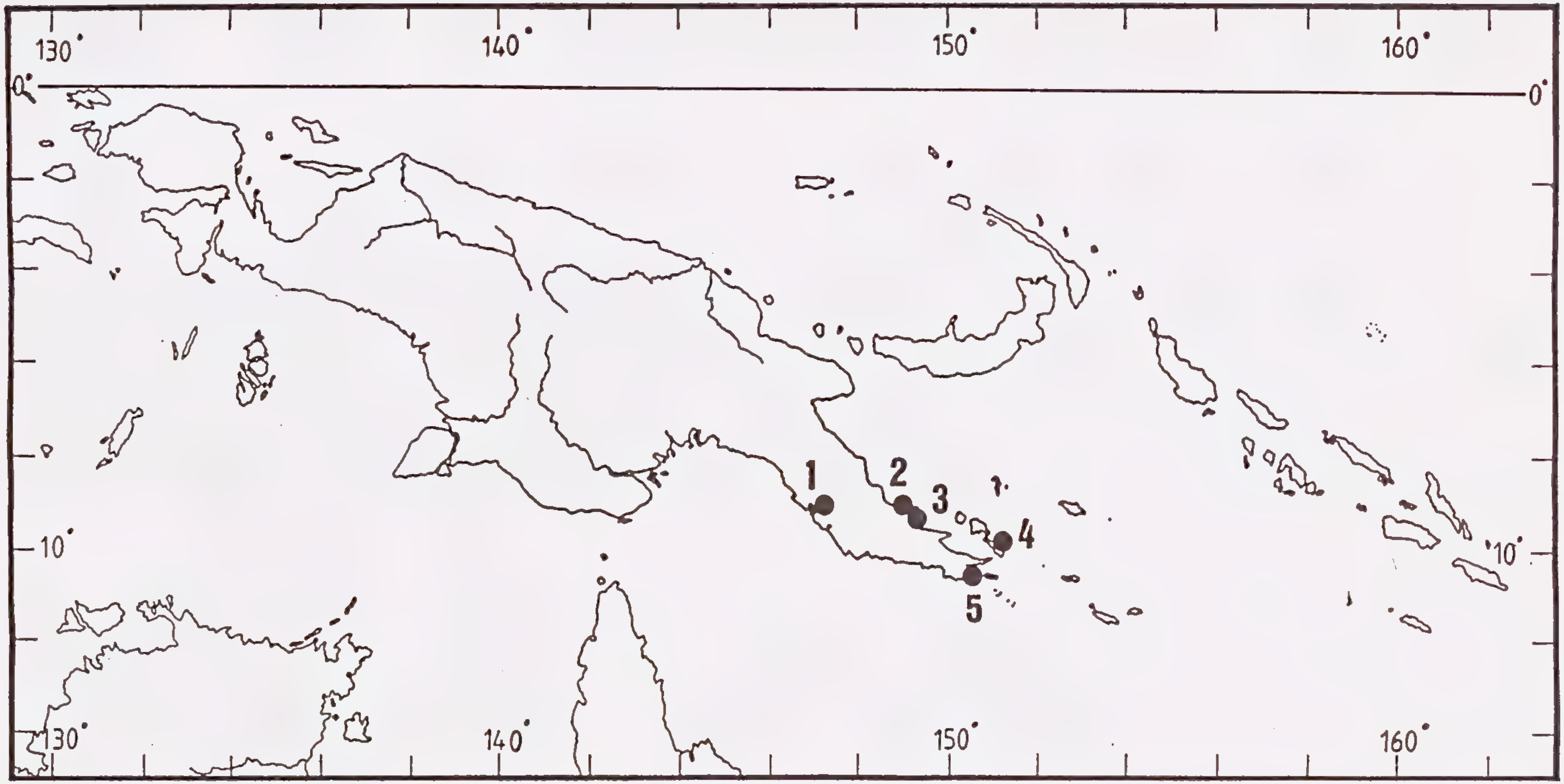
SPATHOGLOTTIS PAPUANA BAIL. — A NOTE ON ITS TAXONOMY AND DISTRIBUTION

By N. H. S. Howcroft*
and W. H. Bandisch**

The type specimen of this species was collected by Lord Lamington's party to New Guinea in 1890 and it was described by Bailey in 1898. The type comes from Porlock Bay (Map 1) and the habitat is described as along the coast with the plants growing in crevices of the rocks.

Two other varieties were described by Schlechter (1912) and Rogers and White (1920) as *S. papuana* var *puberula* and *S. papuana* var *puberiflora.* Types of all three have been examined by the first author during his studies of the genus in Papuasia and found that the two varieties cannot be maintained as separate varieties and that *S. papuana* is quite distinct from these.

The herbarium specimen of Bailey consists only of a leaf and part of the inflorescence comprised of the rhachis, portion of the peduncle, floral bracts and some flowers. The parts are quite glabrous, the floral bracts are small and the peduncle is very slender (Fig. 3). Comparisons between the Schlechter and Rogers and White specimens indicate that the latter is a more robust species with the inflorescence, floral bracts and flowers possessing distinct pubescent surfaces.



Map 1

Distribution of *Spathoglottis papuana* Bail.

Key:

1 – Sogeri and Hombrom Bluff, Rouna
2 – Porlock Bay
3 – Tufi
4 – Sewa Bay
5 – Milne Bay

Bailey's specimen closely resembled an unidentified specimen collected by Carr (No. 10086, Lae) from Rouna area which is located at Sogeri (Map 1), consequently live collections were made from this region and further comparisons made with Baileys's No. 445.

The inflorescence, floral bracts and flowers of these were similar, however when compared with the Schlechter No. 20130 (Fig. 4) which is a young plant complete with pseudobulb (not illustrated) it was noted that annulations or basal leaf sheath scars occurred throughout the length of the pseudobulb while the live collections and Carr's specimens had most of the annulations at the apex (Fig. 5, Plate 7). At this point it appeared that *S. papuana* had been found again.

Bailey's description only indicated shape and size of the pseudobulb which in *Spathoglottis* are phenotypically variable, and he did not describe the annulation patterns. These are dependent on the number of leaves and sheaths and they are, to some extent, more useful in identification, therefore it was expected that, if fresh plant specimens of *Spathoglottis* could be obtained from the type collection locality or near that locality, the identification of the Sogeri specimens could be confirmed.

This year the second author travelled to the Tufi area which is close to Porlock (Map 1) and located extensive colonies of a *Spathoglottis* species growing in conditions similar to that described by Bailey for *S. papuana*. Specimens collected and examined from this area compared very well with Bailey's type and the Sogeri specimens. This included pseudobulb, annulations and plant habit.

From these collections it was concluded that the Tufi and the Sogeri specimens were *S. papuana* and that due to obvious differences between it and the variety *puberula* the latter cannot be maintained as a variety. It is proposed to deal with the taxonomic position of the variety more formally at a later date.

DESCRIPTION

Spathoglottis papuana F. M. Bailey. Qld. Agric. Journ. vol. III, pt. II (1898) 6; Qld. Agric. Journ. LCVII, p.159; LCVIII, p.350; IIX, p.441. Type: Papua New Guinea, Porlock Bay. Bailey s.n. (holotype, BRI).

Spathoglottis papuana var. *puberula* Schltr., Orch. D. N. Guinea (1912) 397. Holotype (B) destroyed; isosyntype Schlechter 20130 (S!).

Spathoglottis papuana var. *puberiflora* Rogers & White, Trans. Roy. Soc. S.A. 44 (1920) 116. Holotype Rogers & White No. 445 (BRI!).

Plant an erect terrestrial c. 25–50cm tall. **Rhachis** short. **Pseudobulbs** ovoid to conic, tunicated with thin papery sheathing bases of leaves, not persistent, annulations confined to apex and one to the basal quarter, rarely near centre and sometimes absent, 3–6 foliate. **Leaves** grass-like plicate, with narrow petioles and sheaths enfolded towards base to form a pseudostem 5.1–12.7cm long. **Lamina** lanceolate, acuminate, 30–45cm long, c. 2.5cm broad, in some locations the leaves are much larger. **Inflorescence** gracile, 25–45cm or more tall; **peduncle** 20.7–37.5cm long, 0.75–2.0mm in diameter, glabrous, with 3 glabrous tubular sheaths; **rhachis** much shorter than peduncle, few flowered at a time, glabrous. **Floral bracts** ovate, 0.7–1.1cm long, 0.4– -.58cm wide, apex acute to acuminate, glabrous. **Flowers** variable in size up to 3.78cm wide. **Dorsal sepals** oblong-ovate, 1.68–2.16cm long, 0.9–0.8cm wide, sometimes dorsally ridged, glabrous. **Lateral sepal** oblong, 1.66–2.13cm long. **Petal** oblong to oblong-ovate, 1.66–2.00cm long, 1.0–1.13cm wide, apex round or acute, glabrous. **Labellum** 3-lobed, when flattened, cruciform with lateral lobes at angles of 88 degrees to 121 degrees to the main axis, 1.36–1.69cm long, c. 1.30–1.68cm between apices of lateral lobes; **lateral lobes** oblong to falcate-cuneate, sub-truncate at apex, 6.3–8.4mm long, 2.5–4.6mm wide at base and 2.5–4.3mm wide at apex. **Midlobe** with claw and broadly obcordate to triangular at apex, **claw** slender, 3.8–5.8mm long, 1.0–1.5mm wide, knee not prominent, sometimes absent, **apical lamina** 5.0–7.6mm wide, **lobules** present at base of callus, not prominent; **callus** bilobed, attenuated at base, 2.0–2.8mm tall, 2.58–3.8mm wide, lobe dorsal plane obscurely triangular to rounded, few glandular hairs present at apex, few to glabrous at base. **Column** slender, c. 1.3–1.6cm long, distinctly arched. **Anther** hooded, slightly umbonate, white. **Pollinia** typical. **Ovary** and **pedicel** slender with few sparsely scattered fine hairs or glabrous. **Fruit** cylindrical, c. 2–3cm long, 0.8–1.0cm diameter, glabrous.

Colour. From nearly white to magenta or dark-purple. Lateral lobes cyclamen to salmon or dark-purple. Callus white or yellow, spotting present or absent, from pink to red. Columns pale pink. Floral bracts similar to petals and sepals, apex green.

DISTRIBUTION (Map 1)

The species is distributed from Porlock Bay to Tufi in the Oro province, the D'Entrecasteaux Islands and Milne Bay region to Sogeri outside of Port Moresby.

The type specimen was collected at Porlock Bay which is near Berubona Mission at the base

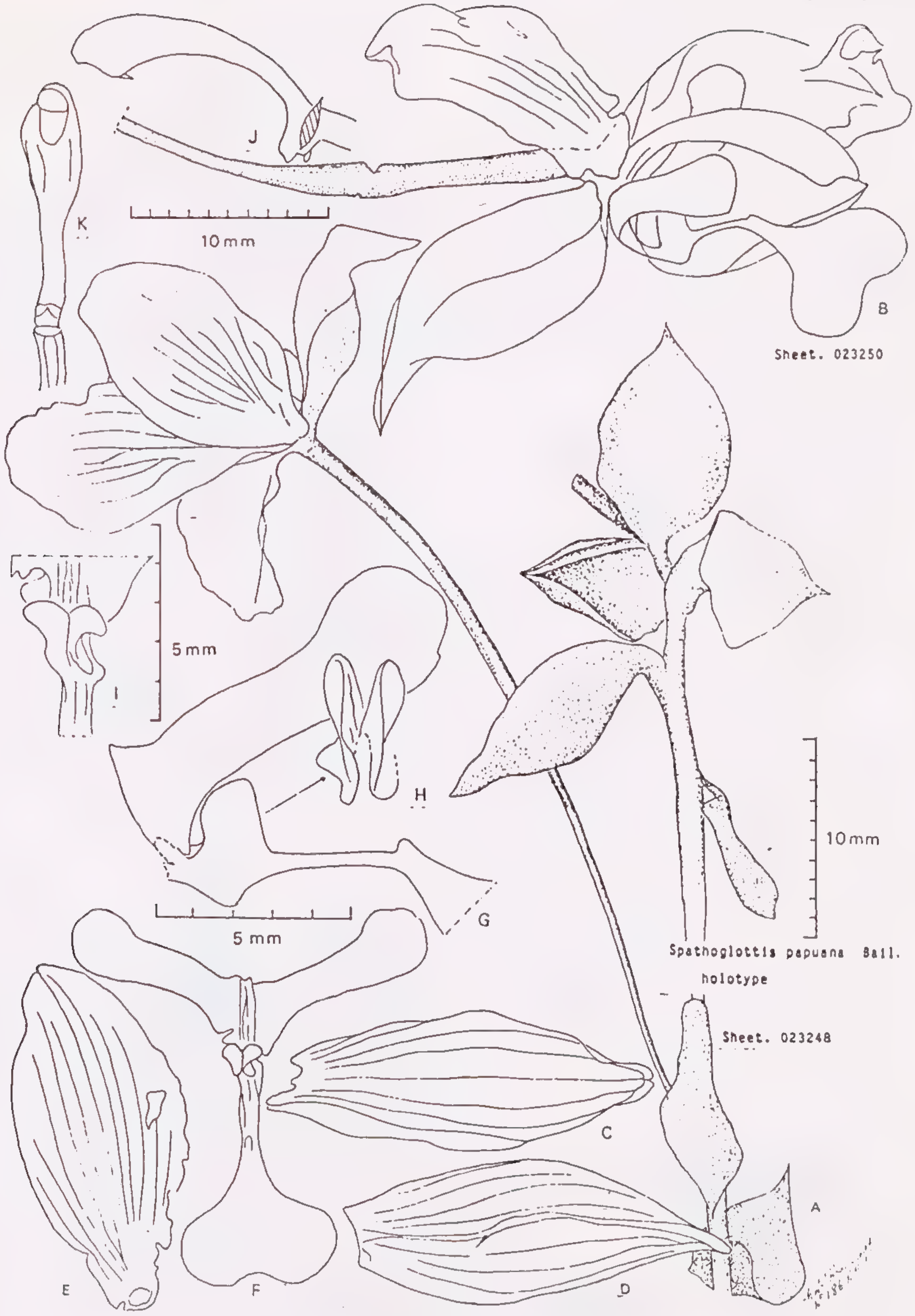


Fig. 3 *Spathoglottis papuana* Bail.
ex Porlock Bay. Holotype. Bailey s.n. BRI.

To 10mm scale:

- **A** – Flower, floral bracts and portion of rhachis;
- **B** – Flower with labellum exposed;
- **C** – Dorsal sepal;
- **D** – Lateral sepal;
- **E** – Petal;
- **F** – Labellum from above, flattened;
- **G** – Callus and claw, side view; to 5mm scale;
- **H** – Callus front view (dried); to 5mm scale;
- **I** – Callus, dorsal view (dried); to 5mm scale;
- **J-K** – Column, side and ventral view; to 10mm scale.

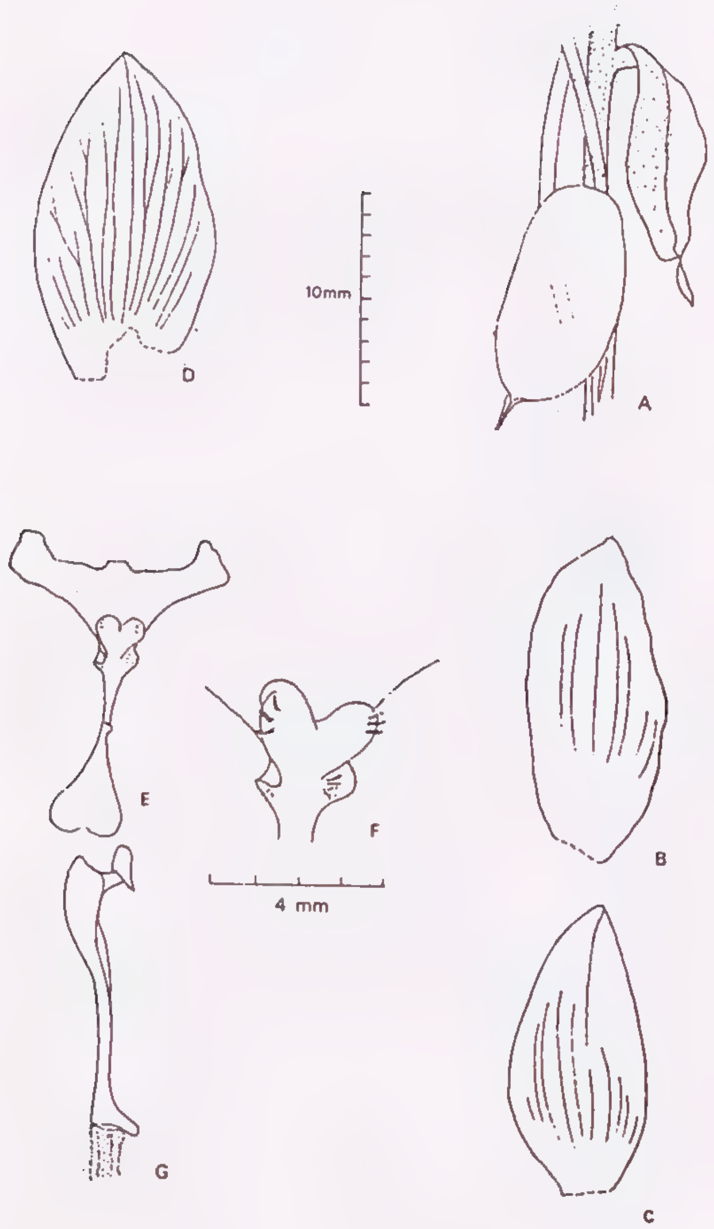


Fig. 4 ***Spathoglottis papuana*** **var.** ***puberula*** **Isotype. L.**

To 10mm scale:

A – Floral bracts on section of rhachis;

B – Dorsal sepal;

C – Lateral sepal;

D – Petal with damaged base;

E – Labellum (flattened, from above);

F – Callus with basal lobules, dorsal view; to 4mm scale;

G – Column with pollen and anther stuck to apex, side view. All drawn from rehydrated dried herbarium material.

of Mt Trafalgar and the Topographers Range in the Oro Province (Map 1).

ECOLOGY (Plates 8, 9, 10 and 11)

In the coastal region it grows in the crevices and on the face of rocks in the leaf mould. Inland from Port Moresby at Sogeri and Hombrom Bluff the species is found in similar situations and in *Eucalyptus* savannah grasslands around the Bluff (Plate 8 and 9). In one location it was found growing in moss on a tree trunk. The species altitudinal range is from 30 to 500m above sea level.

At Tufi populations were observed on the overgrown rock faces (Plate 10) at the entrance to the Tufi wharf and at the first fjord south of Tufi growing in patches of kunai grass. The dark-purple colour forms are more easily detected from a distance and only by closer inspection of the sites are two other distinct colour forms revealed (Plates 11 and 12) growing side-by-side with the dark-purple ones. Plants observed were growing from about 5–10 metres above the sea surface on steep overgrown windswept rocks. The three colour forms observed are growing in individual patches of five to several hundred plants, the three colour forms not intermixed, although in very close proximity to each other. Flowers from both areas can be compared in plates 13 and 14.

SPECIMENS EXAMINED

Papua New Guinea; Brass 2885, Dawa River, Milne Bay; 22113, Baiawa, Milne Bay (Map 1, location 5); Carr 10086, Rouna; Howcroft 348 (A – No. 8), 369, Hombrom Bluff; Womersley 8655, Sewa Bay, Normanby Island (Map 1, location 4), Womersley and Stone 43697, Vesarogo Creek, Rouna.

Not known from Irian Jaya.

NOTES

The species has a pseudobulb which is similar to that of *S. portus-finschii* except it is slightly more conical. Unlike this species, the tunication on the pseudobulbs of *S. papuana* appear to be thicker and last longer (see Fig. 5). The inflorescence of both species is gracile, but *S. papuana* is distinctly glabrous with larger floral bracts than *S. portus-finschii.*

S. papuana var. *puberula* is quite distinct from this species in plant habit, size and tunication and it cannot be maintained as a variety of the species. The difference between the inflorescence of these two taxa is quite marked and cannot be overlooked as it clearly separates the two.

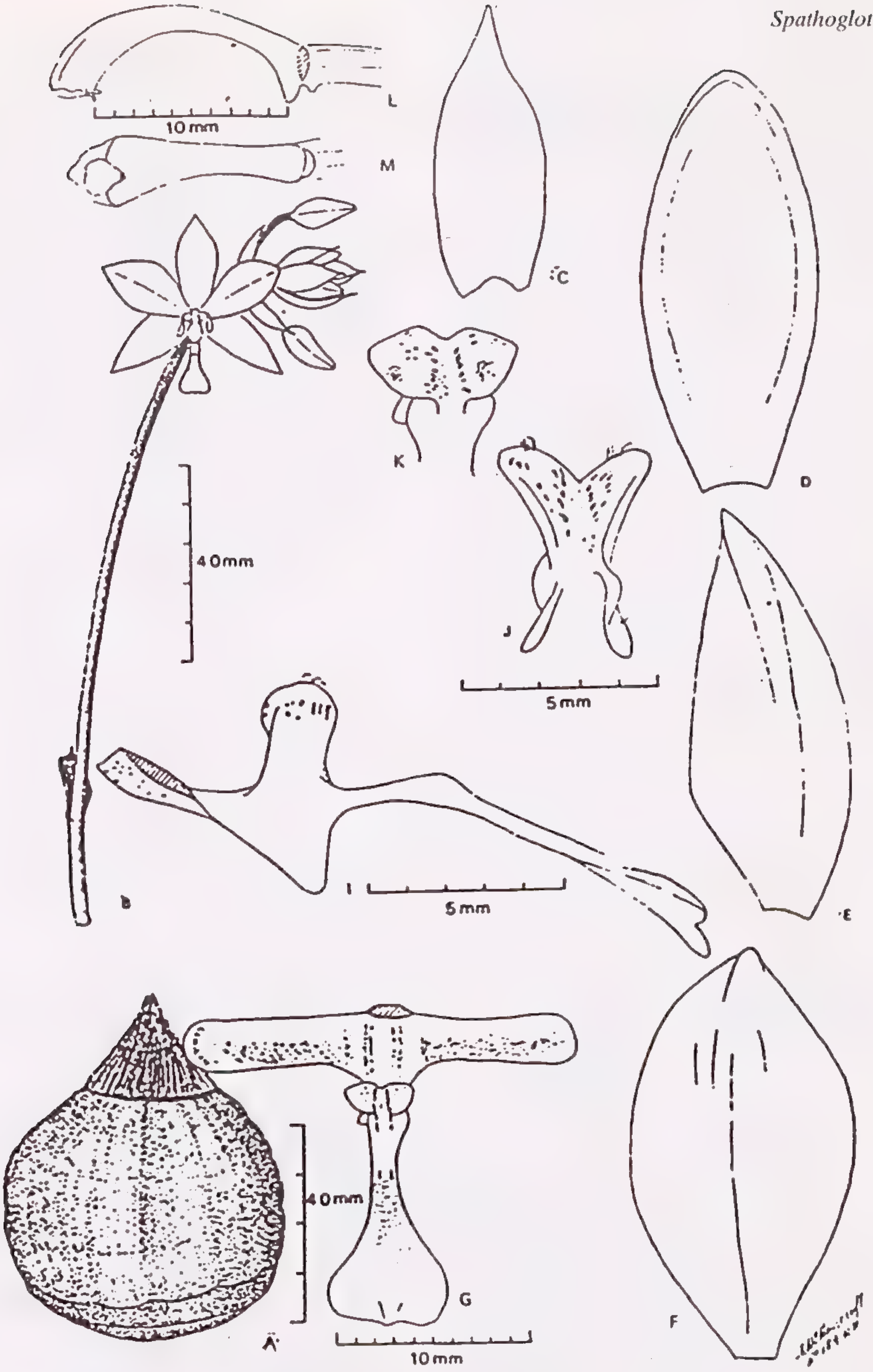


Fig. 5 ***Spathoglottis papuana*** **Bail. ex Hombrom Bluff.**

- **A** – Pseudobulb; to 40mm scale;
- **B** – Inflorescence; to 40mm scale;
- **C** – Floral bract; to 10mm scale;
- **D** – Dorsal sepal; to 10mm scale;
- **E** – Lateral sepal; to 10mm scale;
- **F** – Petal; to 10mm scale;
- **G** – Labellum from above, falttened; to 10mm scale;
- **H** – Omitted;
- **I** – Labellum with side lobes cut away to show callus, lobule and claw; to 5mm scale;
- **J** – Callus, front view; to 5mm scale;
- **K** – Callus outline, dorsal view; to 5mm scale;
- **L-M** – Column, side and ventral view; to 10mm scale.

The main difference in the flowers is the glabrous tepals and a callus of smaller dimensions in *S. papuana* and in the dorsal plane a different shape and smaller size of the floral bracts.

The species has been reported to occur along the Hiritano Highway, north-west of Port Moresby and from accounts it may even be more robust than those examined. More populations of this species need studying to determine the extent of its variation.

REFERENCES ARE AS FOLLOWS

Bailey, F. M. 1898. Queensland Agricultural Journal, Vol. III, pt. II:6.

Rogers, R. S. and White, C. T. 1920. A Contribution to the Orchidaceous Flora of Papua (British New Guinea). In Transactions and Proceedings of the Royal Society of South Australia, Vol. XLIV pp.116-117.

Schlechter, R. 1911-4. Die Orchidaceen von Deutsch Neu Guinea, Fedde Repert., Sp. Nov. Beih. 1: 1-1079.

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10TH ANNIVERSARY SPRING SHOW FOR A.N.O.S. SYDNEY GROUP INC.

Although established in the Society's founding year, 1963, Sydney Group did not commence to hold Spring Shows in its own right until 1983. All the shows prior to this were held in conjunction with Warringah Group. This year marks the 10th anniversary of the first show, held at the Ryde School of Horticulture in October, 1983.

The 1992 Spring Show will be held over the weekend of 19/20th September at the Baulkham Hills Community Centre, Conie Avenue (off Seven Hills Road), Baulkham Hills. Set-up will be on Friday, 18th September from noon and judging will commence at 8.00 p.m. Extra prizes will be on the schedule for this year's special event.

We will also inaugurate a perpetual prize to be known as "The Don Barnham Award" for the Champion Specimen Species of the Show. Don was the first person granted Life Membership of Sydney Group and is one of our longest continuing members. He served for many years on the Committee and benched many superbly grown specimens of species orchids when he was actively exhibiting his plants. This award will honour his contributions and achievements at this and future Spring Shows.

Sydney Group also pioneered the holding of special shows later in the spring to cater particularly for *Sarcochilus* and allied genera that are not in all their glory until October or November. These "*Sarcanthinae*" shows are now very popular. Sydney Group's 7th such show will be held on Sunday, 25th October, also at the Baulkham Hills Community Centre.

If you want to see and buy, the very best Australasian native orchid species and hybrids you should not miss these two shows. All details are available from Darryl Smedley, Show Marshall, P.O. Box 890, Baulkham Hills, N.S.W. 2153 or phone (02) 639-6846.

NATIVE ORCHID SHOWS

SPRING SHOWS

Sept. 5 & 6	ANOS Newcastle Group – Wetlands Centre.
Sept. 5 & 6	ANOS Central Coast Group – Scout Hall, Gosford.
Sept. 6	ANOS Port Hacking Group – Scout Hall, Old Bush Road, Yarrawarra.
Sept. 11–13	ANOS Warringah Group – Community Hall, Starkey Street, Forestville.
Sept. 16–19	ANOS Macarthur Group – Casula Shopping Centre.
Sept. 18–20	ANOS Sydney Group – Baulkham Hills Community Centre.
Sept. 19 & 20	Native Orchid Society of S.A. – Mitcham Girls High School, Kingswood.
Sept. 25–27	Wollongong and District Native Orchid Society – Wollongong Botanic Gardens, Madeline Street.
Oct. 3 & 4	ANOS Victorian Group – National Herbarium, Birdwood Avenue, South Yarra.

SARCANTHINAE SHOWS

Oct. 15–17	ANOS Newcastle Group – Lake Macquarie Fair Shopping Centre, Mt Hutton.
Oct. 25	ANOS Sydney Group – Baulkham Hills Community Centre.
Nov. 1	ANOS Port Hacking Group – Scout Hall, Old Bush Road, Yarrawarra.

THE R. D. FITZGERALD TROPHY — A TROPHY FOR WORK WITH AUSTRALIAN NATIVE ORCHID SPECIES

R. Rudkin
Honorary Secretary I.B.T.C.
18 Lyle Avenue
Lindfield, N.S.W. 2070

As the popularity of Australian native orchids grows, more attention is being given to species, particularly in the realm of line breeding in an attempt to enhance their particular attractiveness. This was brought to the attention of the Ira Butler Trophy Committee and after much consideration it was agreed that some recognition should be given to those who have done significant work in this direction.

In discussion on the problem of the position of Australian species at present, it was realised that line breeding was only one aspect of work that was being done. Their preservation in many cases was of paramount importance. Yet another aspect was the task of improving the propagation of species.

It was decided that the time had come for a trophy for work on species. As a name for this new trophy it was decided to honour Robert David FitzGerald who had quietly done a great deal to popularise Australian orchid species.

The objective of the new trophy is defined as:–

> The R. D. FitzGerald Trophy is a trophy presented for work of major significance to the development, advancement and propagation of Australian Native Orchid Species.

Nominations may come from any A.N.O.S. Group and should be directed to A.N.O.S. Council for consideration and forwarding to the I.B.T.C. or may also come from any State Affiliated Orchid Society through the relevant State Society to the Orchid Society of N.S.W. for consideration and then forwarded to the I.B.T.C.

The nomination should take the form of a written submission with full details and relevant documentation to enable the I.B.T.C. to reach a decision. All documentation including photographic evidence will become the property of the I.B.T.C.

This trophy is not to be given on a regular basis but as a nomination is accepted by the I.B.T.C. As a matter of principle the trophy will be given to a person only once except in exceptional circumstances.

Plate 18 illustrates a man-made sibling *Dendrobium tetragonum.*

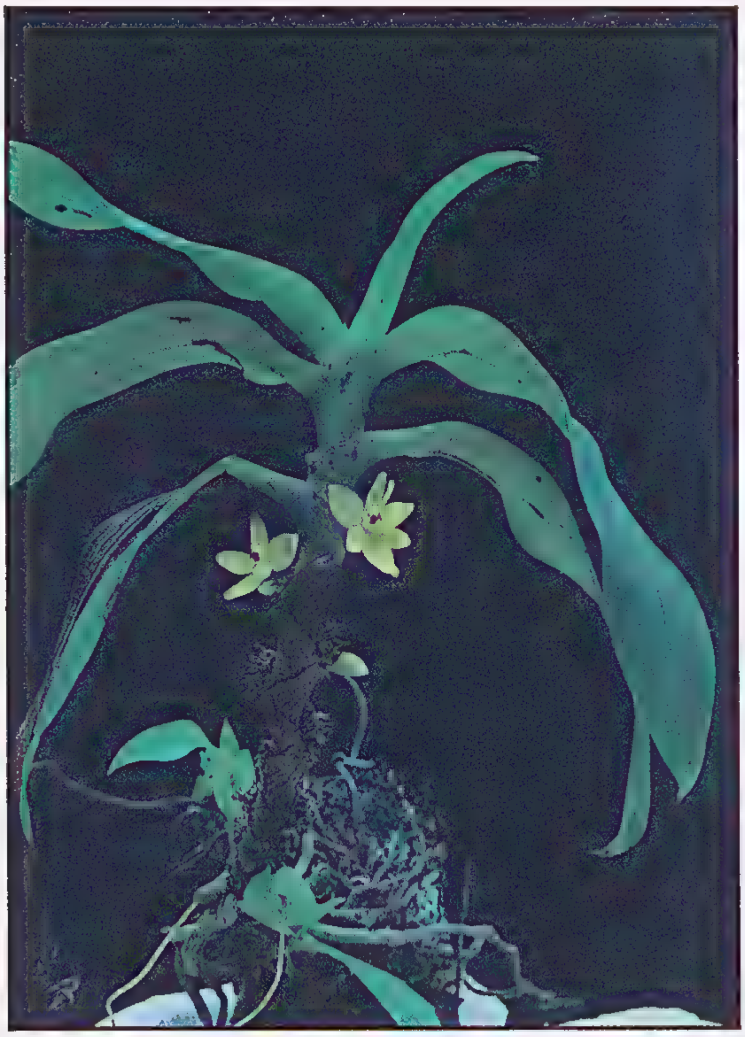


Plate 15: *Sarcanthus chrysanthus.*
Photo F. Featherstone.

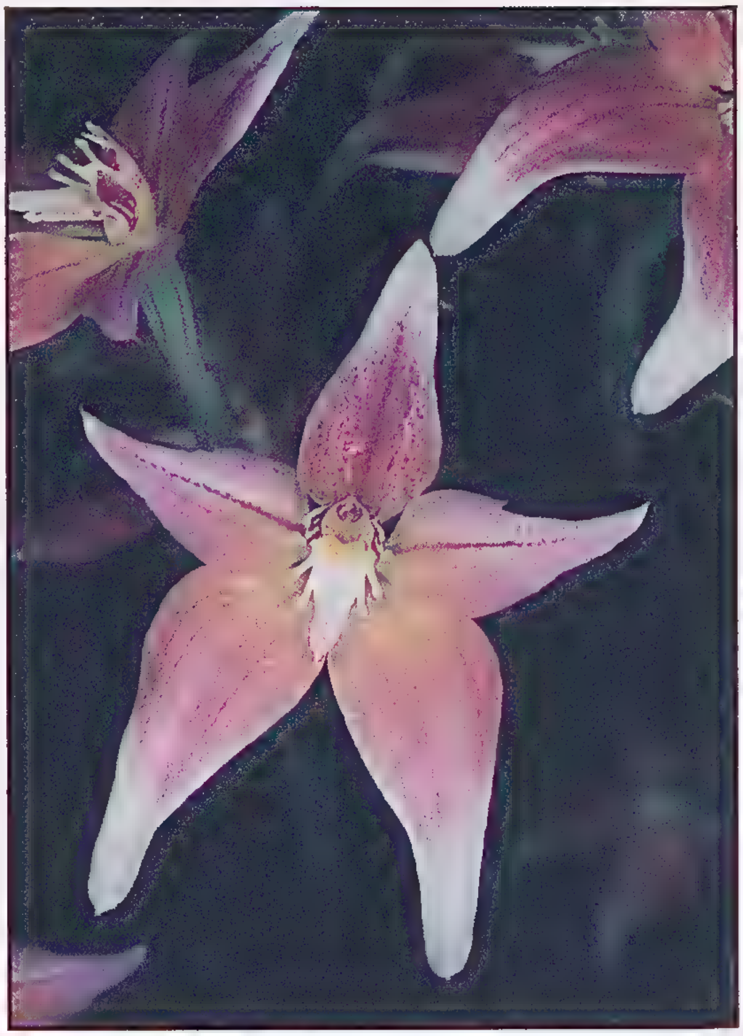


Plate 16: *(Caladenis latifolia x C. flava)* 'Harlequin'.
Photo R. Bates.

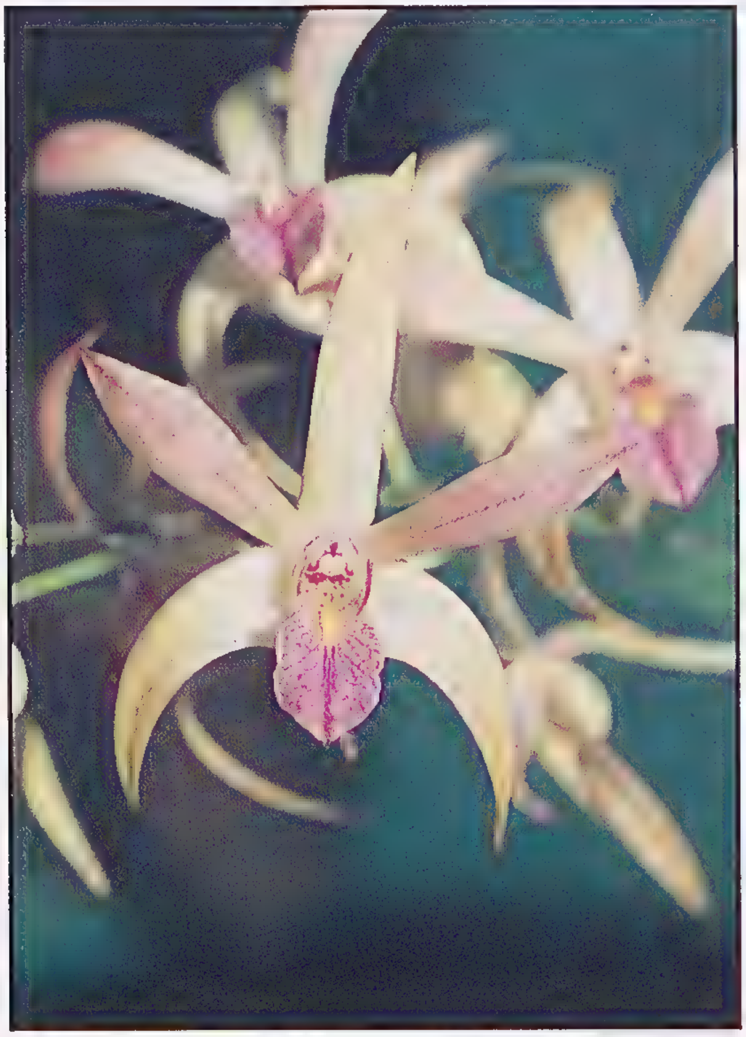


Plate 17: *Dendrobium* 'Elegant Heart'.
Photo A. Peck.

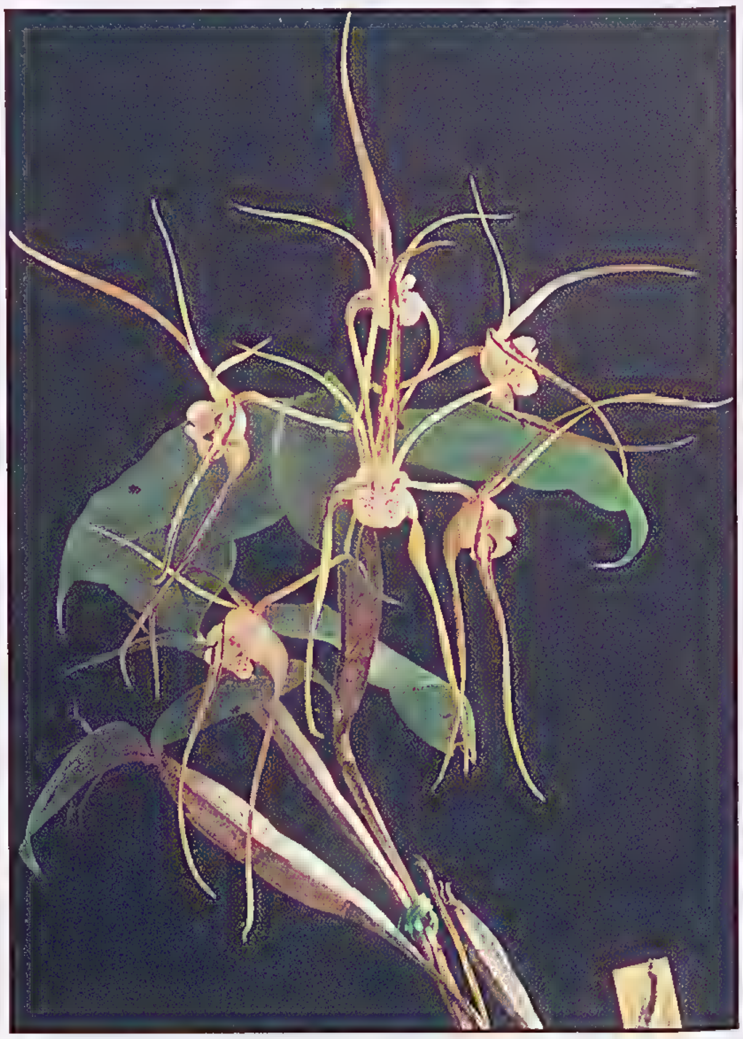


Plate 18: *Dendrobium tetragonum* '2493' *(D. tetragonum* var. *giganteum x D. tetragonum* No. 1).
Photo W. T. Upton.

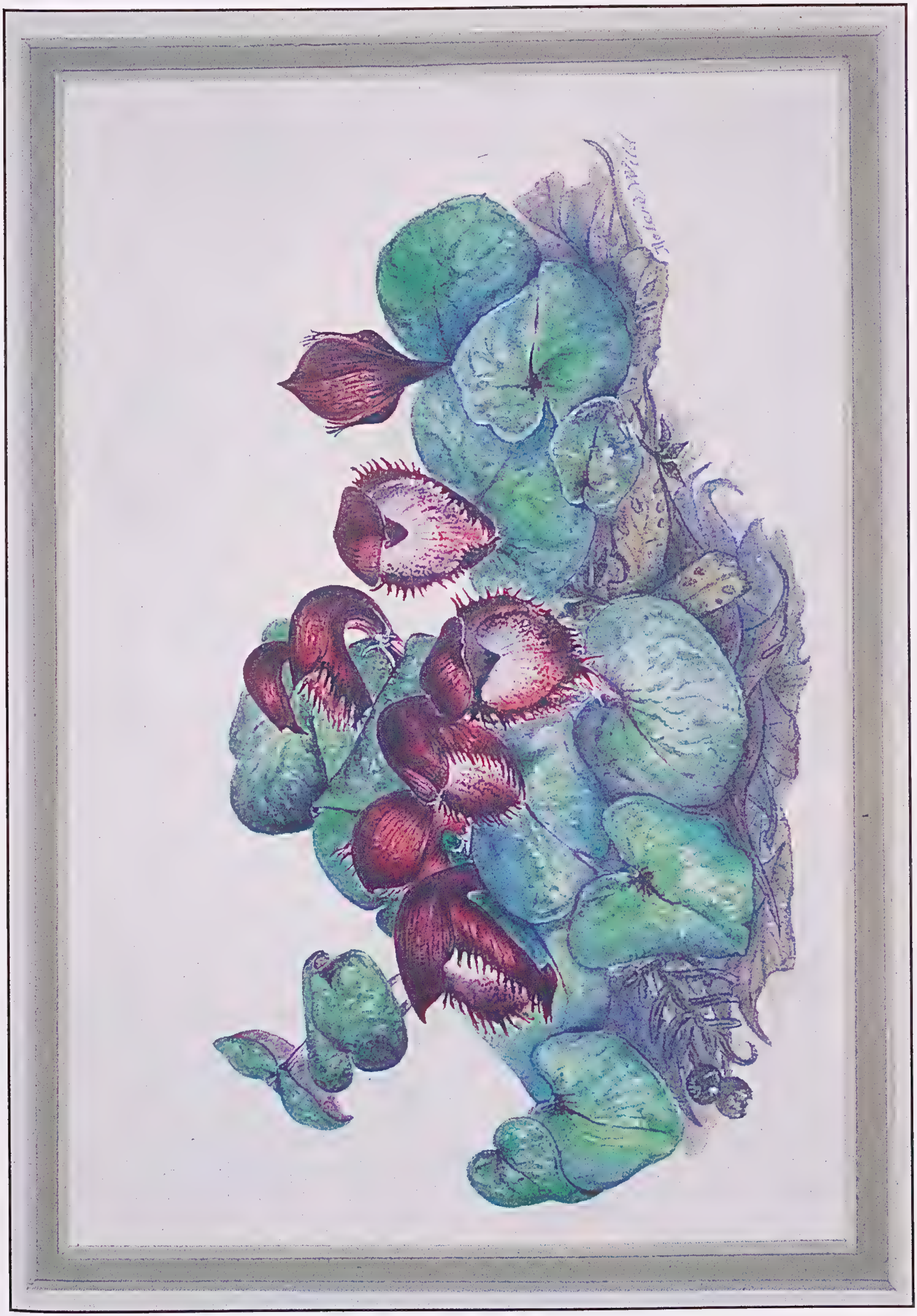


Plate 19: *Corybas hispidus* Jones from a painting by Helene Wild.

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 5: *Corybas hispidus* Jones

Common Name:	Bristly or hispid helmet orchid
Subfamily:	Orchidoideae
Tribe:	Diurideae
Subtribe:	Acianthinae
Genus:	*Corybas* Salisbury

Distribution: *Corybas* is a widespread genus, with species occurring from northern India and southern China, to as far south as Macquarie Island. *Corybas hispidus* is found in south-east Queensland, New South Wales, A.C.T. and Victoria.

Notes: All *Corybas* are terrestrial orchids and are very distinctive with their single oval leaf and a single "helmet-like" flower, which sits nearly prostrate on a short stem. The flowers are unusual in that they are dominantly composed of the labellum and the dorsal sepal. In the Australian species the lateral petals and sepals are small and inconcpicuous, while in a number of New Zealand species these petals and sepals are long and filiform resulting in the common name of "spider orchids". *C. hispidus* can be distinguished as the labellum is entirely covered by short, but conspicuous bristles. The labellum is also centrally notched and the lateral sides at the base of the labellum and the dorsal sepal form a tube which neatly surrounds the column.

Pollination: There is no recorded pollinator for this species. Two species of *Corybas* are thought to mimic the fruiting bodies of fungi and are reported to be pollinated by fungus gnats.

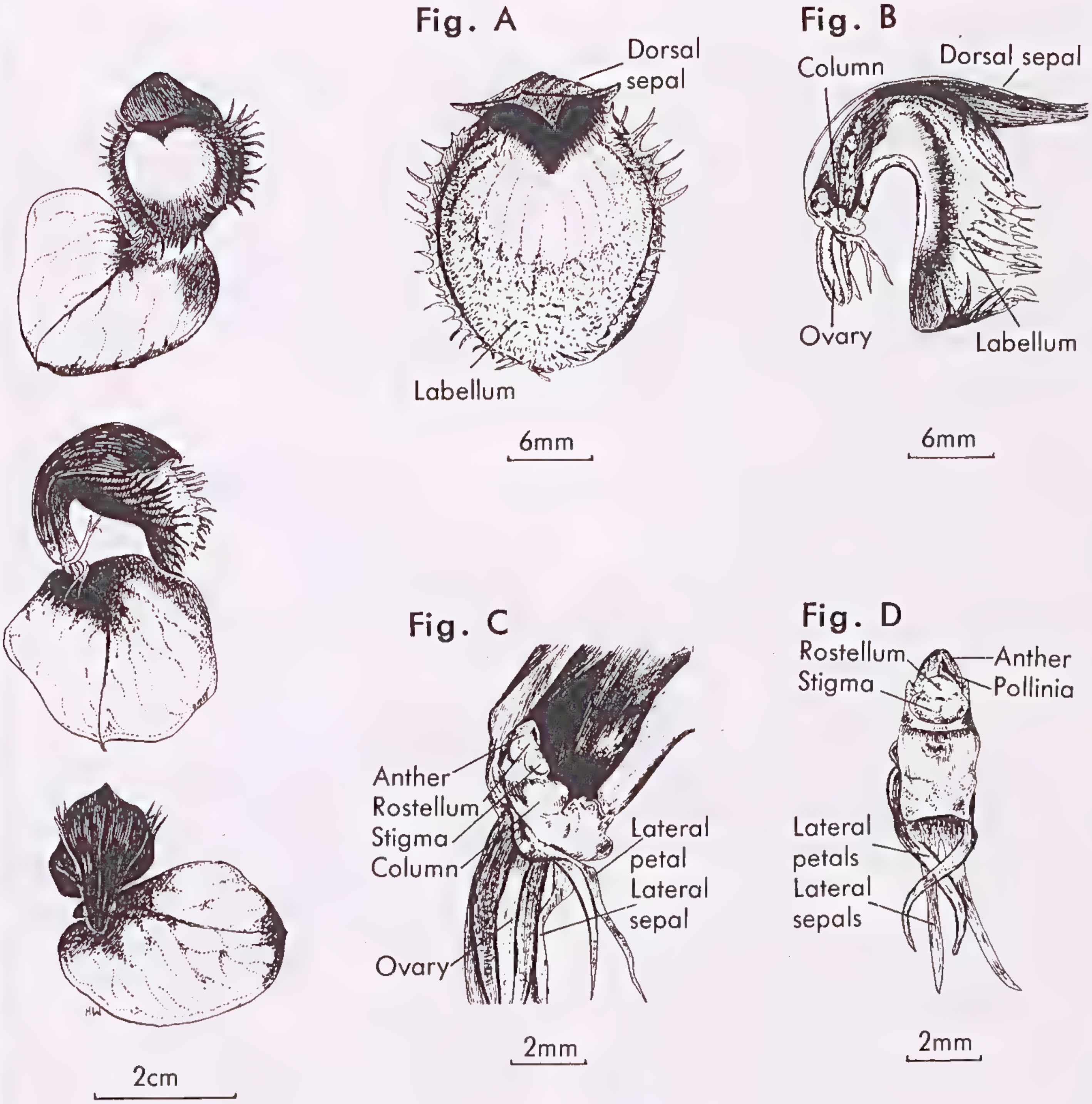
Conservation status: This species is considered as rare within Victoria.

Culture: *Corybas hispidus* is a colony forming terrestrial. This orchid can be grown in a basic terrestrial orchid mix with extra leaf mulch. It requires a cool and moist position under 70% shade. The flowers are very sensitive to heat and wind and whilst developing will abort if not protected. A common method used ot protect flowers is to cover the pot with clear plastic or glass, as soon as the developing buds are noticed. The pot should never be allowed to dry out totally over the dormant summer period.

Illustration: Painting: Illustrated is a colony of *C. hispidus,* note how the flowers are almost sessile on the single leaf and how the flower resembles a helmet. Drawing: On the left is the flowering plant from a number of angles. a) flower from the front. b) flower from the side with half the labellum and dorsal sepal removed, note how the column is small and hidden by the dorsal sepal and labellum. c) an oblique front view of the column, showing the stigma, rostellum and the anther. d) front view of the column.

Description: By Tony Slater, 159a Raleigh Street, Thornbury, Victoria 3071.
Illustration: By Helene Wild, 56 Civic Parade, Seaholme, Victoria 3018.
Floral material was kindly donated by Helen Richards and Malcolm Thomas.

Corybas hispidus Jones



Corybas hispidus Jones from a line drawing by Helene Wild.

THE HIDDEN SECRETS OF *SARCOCHILUS*

Phil Spence
P.O. Box 102,
Forestville, N.S.W. 2087

I started growing (or killing) *Sarcochilus* species some 35 years ago; at that time the only plants one could obtain came from the bush or from a commercial collector, fortunately, over this period of time, much has changed.

Over the past 25 years I have been greatly interested in overcoming any rape of the bush and to this end, I have considered three different fields of approach with the epiphytic native orchids.

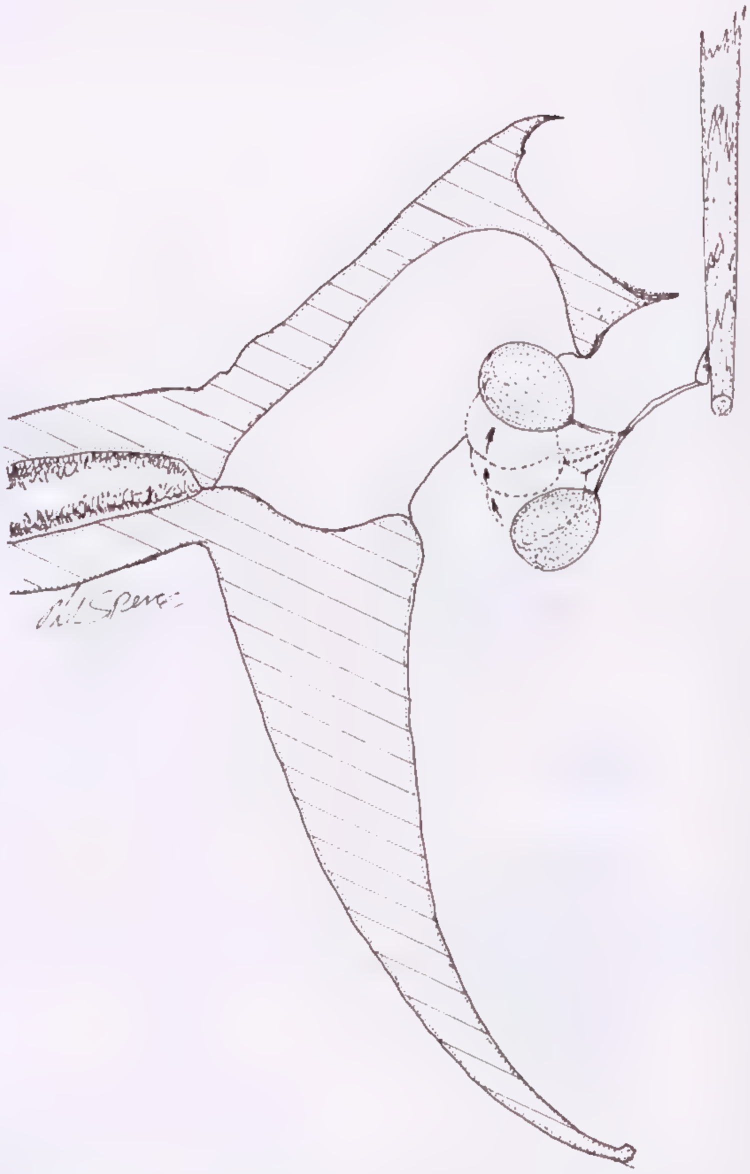
The first is to raise from seed any rare species I can obtain and to then distribute them to worthy people and institutions, as I see fit. The balance I sell to cover my costs. A few of the species so far raised are *Sarcochilus hirticalcar, S. roseus* (albino form) and most recently *Sarcanthus chrysanthus* from New Guinea. (Plate 15).

Secondly I am line breeding with some of the easier to cultivate species, which have considerable horticultural merit. I am now raising 5th generation seedlings of *Sarcochilus hartmannii* and am encouraged by the promise shown by the flowering plants I have seen from my 4th generation breeding. The future augurs well for this kind of breeding, not only for exhibition but also as cut flowers.

Lastly and possibly the approach with the greatest potential, hybridising. I have made many hybrids, in many genera, *Dendrobium, Cattleya, Paphiopedilum, Cymbidium,* etc., many thousands, too numerous to name.

Sarcochilus are, I consider, rather unique. One might ask: Why is that? One reason would be the pollinia when hybridising; it is difficult to remove it immediately from the anther cap, but then this is not the only genus to which this applies.

Pollen can however, be removed easily if the anther and its contents are placed on a clean piece of paper for a period of 5 to 10 minutes. Weather, temperature, or the time of day, does not appear to make any difference to this process. A phenomenon that I have watched and has greatly intrigued me, over the past 10 years or so, is the apparent static relationship between the stigmatic surface and the pollinia. It would appear there is a vacuum or suction within the stigmatic surface or cavity, pulling or attracting compatible pollen. (Figure shows this movement).



From my observations this only applies to pollinations which develop a good seed capsule with viable seed inside. Strangely this action only applies when the pollen is acceptable or compatible with the capsule bearing parent. Conversely the reverse action appears to apply with the pollinations that subsequently abort, in these cases I have observed that it is almost impossible to place the pollen into the stigmatic cavity, a force from within seems to push it away.

The condition of the pollen is not relevant to this attraction or rejection, it does not appear to matter whether it be fresh, left to stand for a short time or if it has been under refrigeration for three months or indeed up to two years.

My observations have been confirmed by many well-known hybridists, including Ken Russell, with whom I have discussed it at great length. I mentioned it to Lorraine Fagg of

Geelong, some two years ago and she has since confirmed my observation.

Of the thousands of pollinations I have made, not all produce viable seed and only a small proportion of these are within the subtribe *Sarcanthinae*. Within this subtribe I have, as a conservative estimate, made well over 5,000 attempts with *Sarcochilus* interclonal and interspecific cross pollinations and hybridisation to the 3rd and 4th generations. Intergeneric cross pollinations are not always easy, particularly with the hybrid genus *Sarconopsis* when as many as 300 cross pollinations have been necessary before achieving any success.

WILL THEY RUN HOT AND COLD

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Many years of hybridising have taken place within the Australian members of the genus *Dendrobium*. The pace quickened in the eighties and shows signs of further impetus during the nineties.

I feel the hybrids resulting from the breeding between the two subgenera *Athecebium* and *Dendrobium* will be the future “Stars” as we approach the year 2000. We ask ourselves will it be the “hot and cold” hybrids that lead the way?

We are looking for larger and longer lasting flowers on plants of a manageable size, with the potential to flower profusely at least twice a year. these much sought after characteristics are being supplied by this kind of hybridising; in addition we are achieving plants that are cool growing for the growers in the southern parts of Australia as well as those with the flower shapes of the southern kinds to flower in the northern parts.

One particular characteristic I have noticed with this breeding is the larger flower size of the progeny as compared with the parents. A few examples of these are *D.* Aussie Angel (*D. bigibbum* X *D.* Aussie Ira), *D.* Reg Burns (*D. affine* (as *D. dicuphum*) X *D. fleckeri*), *D.* Elegant Heart (*D.* Peewee X *D. speciosum*), *D.* Brinawa (*D.* Hilda Poxon X *D. bigibbum*) (Plate 20), *D.* Warringah (*D. bigibbum* X *D. speciosum*), *D.* Val Peck (*D.* Aussie Angel X *D.* Eureka). as well as the spectacular size of some of the progeny, the colour in many is outstanding, often vibrant, as well as bi and tri coloured, petal splashes, pastels and wonderful autumn tones.

Much time and effort is necessary to achieve one's objectives. It will take more than one generation; there is no easy alternative. About 1980 I started crossing *D. bigibbum* and *D.* Hilda Poxon, looking for *D.* Peewee shaped flowers and hoping for different colours. Success finally came in 1983 with *D. bigibbum* as the pod parent, germination was poor resulting in only about 12 seedlings.

In 1984, this time using *D.* Hilda Poxon as the pod parent, I had good germination; the seedlings were strong right from the beginning, only four months in the flask from replating to planting out. These seedlings soon overtook the 1983 cross and flowered sixteen months from the flask, twelve months quicker than the first cross.

The first three plants to flower were all different — two large star shapes, one pink, one white with the basal half of the segments and lip coloured pink; the other was an intermediate shaped pink. The colour of the progeny was from dark cerise to cream with coloured centres, to white. The 1983 cross was in the reverse, darker on the apical half of the segments and white towards the centre. Flowering time ranged from autumn to spring. Sometimes up to three times in the one season.

D. speciosum in all its varieties has played a large roll as a parent supplying the needs for the greater number of flowers to the raceme and their size. I am looking forward to the flowering of more hybrids with *D. speciosum* var. *pendunculatum* as one of the parents. This should produce upright racemes with a long peduncle, a good flower count and compact plants. Much consideration should be given to the clones of *D. speciosum* used in hybridising, avoiding those which “white out” the colours, we can only overcome this with experience and the knowledge of the dominant and recessive characteristics of each clone. One often feels that hybridising is as much a gamble as a toss of the dice.

I was stunned when I first saw Wal and Jill Upton's *D.* Elegant Heart in flower; the size, shape and colour were what we were looking for in a parent. I had seedlings of a remake of this cross by Allan Peck (Plate 17), growing quite well; after seeing Wal and Jill's Plant in flower I could not wait for mine to flower. Allan had used a *D.* Peewee from Wal Upton's cross "863"; in my mind this parent will surprise a lot of orchid growers with its ability as a parent, when more of its progeny are seen on the show bench. The *D. speciosum* used was a large yellow var. *speciosum,* clonal name 'Jenny', a classic type we all want to own. The first seedling to flower had eleven flowers on the raceme and were a cerise colour with a background of yellow suffusions. More surprises as further clones flowered, particularly the yellows with pink lips. Mature plants are now producing up to 22 flowers and averaging 15 flowers to the raceme.

At the present time the "star" parent has to be *D.* Peewee, with winning progeny such as: *D.* Elegant Heart (*D.* Peewee X *D. speciosum*), *D.* Elegant Lace (*D.* Peewee X *D.* Ira's Star), *D.* Elegant Sunset (*D.* Peewee X *D.* Star Of Gold), *D.* Brinawa Sunset (*D.* Peewee X *D. falcorostrum*), *D.* Brinawa Charm (*D.* Peewee X *D. kingianum*), *D.* Brolga (*D.* Peewee X *D.* Hilda Poxon), *D.* Lorikeet (*D.* Peewee X *D.* Ellen), *D.* Rosella (*D.* Peewee X *D. tetragonum*) and (*D.* Peewee X *D.* Sunglow).

The hybridist's imagination runs wild with other breakthroughs like *D.* Manning (*D.* Willowie Gold X *D. speciosum*) *D.* Warringah (*D. bigibbum* X *D. speciosum*), *D.* Aussie Angel (*D. bigibbum* X *D.* Aussie Ira), *D.* Brinawa Mist (*D.* Gloucester Sands X *D. speciosum*), *D.* Colonial Maid (*D. bigibbum* X *D. falcorostrum*) and (*D.* David Baver X *D. speciosum*).

We have had some great successes but, on reflection, there still remains endless possibilities for future hybrids, we have a wealth of material to work with.

SOME HINTS ON SELECTING NATIVE *DENDROBIUM* HYBRIDS

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When selecting and buying Australian *Dendrobium* seedlings it is often difficult to know what to expect from a particular crossing where only the cultivar name is shown, i.e. 'Hilda Poxon', 'Bardo Rose', etc. Usually the only information given is "expect yellow or red or whatever", but rarely gives any indication of flower shape, size of plant, number of flowers, etc.

A knowledge of the species parentage of each hybrid will give a good indication of what to expect. If you don't know the parentage ask the person selling the plant. there are no hard and fast rules or guarantees with any crosses no matter what the genus, that's what makes them so interesting (and at times frustrating).

The closer the progeny is to the species parent the more predictable the outcome is likely to be. This is because the gene pool is restricted to those contained within the two parents used in the cross, then as more species are used to make further crosses the more complicated the hybrid becomes as obviously there are many more genes involved making it difficult to forecast the end result.

Some species are more dominant in their genetic influence than others and this dominance will show through, sometimes for several generations. It helps to know which is which when selecting your seedlings.

Dendrobium kingianum has been used extensively in breeding, mainly for its shape, colour and size which is imparted into many of its progeny. If you acquire a plant with *D. kingianum* as one parent you can expect flowers in the red to pink shades, nicely shaped up to 3cms in size. Plant form will usually follow the kingianum parent which may be short and stubby or tall and slight, up to 55cms tall but in almost all cases the plant is neat and compact. Some of the hybrids to look for having *D. kingianum* in their makeup are, firstly some primary hybrids, (that is using any two species to produce a hybrid) crossed with *D. speciosum* makes *D.* x *delicatum* sometimes shown as *D. specio-kingianum.* With *D. falcorostrum* to make *D.* Bardo Rose. With *D. fleckeri* produces *D.* Hastings and *D. jonesii,* syn. *ruppianum,* for *D.* Ella Victoria Leaney. These are all readily identifiable with the shape, colour, etc. of *D. kingianum.*

The other species used in the above crosses contribute various desirable features *D. speciosum* and *D. jonesii* increases the flower count. *D. fleckeri* influences the colour range and accentuates the kingianum shape while *D. falcorostrum* increases flower size and improves texture.

As stated earlier even quite advanced hybrids having *D. kingianum* in it's background still shows its dominance, either in shape or colour. Some of these are *D.* Telecon, *D.* Blushing Rose, *D.* Susan, *D.* Aussie Freckles and many more.

Another very dominant species is *D. tetragonum,* influencing its progeny by way of size and shape of its flowers. Colour is also dominant except when crossed with *D. kingianum* or any of its progeny, in which case the red/pink of *D. kingianum* predominates. The shape is quite different from that of *D. kingianum* being much larger (flowers up to 20cms long in the variety giganteum). All segments are long and narrow giving the flower a spidery appearance. The labellum is wide, flat and beautifully marked. The species *D. tetragonum* var. *giganteum* flowers from the beginning of autumn through winter to late spring, a trait passed on to its progeny. It is important to ascertain that the variety giganteum is used in a particular cross if you wish to have this continuous flowering. For instance I have plants of *D.* Ellen (*D. kingianum* X *D. tetragonum*) and *D.* Hilda Poxon (*D. speciosum* X *D. tetragonum*) some made with variety giganteum which flower just about all year round. Others made using *D. tetragonum* var. *tetragonum* only flower in the spring. In addition flowers on the former cross are usually much larger than those on the latter. Some other nice *D. tetragonum* crosses are, with *D. falcorostrum, D.* Star Of Gold with *D. fleckeri* to make *D.*Golden Glory with *D.* x *delicatum* to produce *D.* Ku-Ring-Gai and *D. adae* to make *D.* Star Imp and many, many more. *D. tetragonum* has been used more than any other species in producing Australian hybrids. Recent hybridising trends have seen it used successfully with the tropical species *D. bigibbum* in an attempt to create cool growing hybrids in new and different colours, some of which are *D.* Peewee (*D. tetragonum* X *D. bigibbum*). *D.* Rosella (*D. tetragonum* X *D.* Peewee). *D.* Aussie Angel, *D.* Lorikeet and *D.* Elegant Heart, etc.

D. speciosum is not a dominant species but when used with other species does tend to increase the flower count of its progeny. The same can be said for the similar species *D. jonesii.* As a general rule hybrids having either species as a parent tend to take several years to reach flowering size and can grow into very large plants, but having attained maturity are very floriferous and well worth having.

D. fleckeri while not being an overly dominant species has been used a great deal in hybridising, mainly to introduce its beautiful apricot colour into its progeny. Many of the *D. fleckeri* hybrids are of a good shape and come in lovely yellow, gold and apricot shades some of which are *D.* Eureka (*D. fleckeri* X *D. jonesii*). *D.* Peter (*D. fleckeri* X *D. falcorostrum*). *D.* Peach Glow, *D.* Lynette Banks, *D.* Hastings, etc.

A species which is dominant particularly in regards to plant form and flower colour is *D. gracilicaule.* The very slender upright pseudobulbs are evident even in 4th and 5th generation progeny. The flowers of the species are yellow with red/brown markings on the reverse side of the flower. This spotting is almost always passed on to the resulting hybrid often in the form of suffused colour rather than distinct spotting. A typical example is *D.* x *suffusum* (*D. gracilicaule* X *D. kingianum*), a natural hybrid demonstrating the dominant colour red from *D. kingianum* with the dominance of the spotting from *D. gracilicaule* resulting in an attractive flower of red to pinkish hues suffused with darker reddish brown markings. Some other crosses are *D.* Susan (*D. falcorostrum* X *D. gracilicaule*). *D.* Golden Fleck (*D. fleckeri* X *D. gracilicaule*), *D.* x *gracillimum* a natural hybrid between *D. gracilicaule* and *D. speciosum, D.* Golden Cascades (*D. gracilicaule* X *D. jonesii*), *D.* Shan Leaney (*D. gracilicaule* X *D.* x *gracillimum*), *D.* Kim Heinze and many more.

This is not, nor was it intended to be, a comprehensive account of all Australian Dendrobiums used in hybridising but just enough to indicate the advances made in this area of orchid culture in recent years. If you wish to discover more on the subject I can do no better than recommend the reading of Walter T. Upton's excellent book "Dendrobium Orchids Of Australia" and obtain a copy of "The Australian Native Orchid Hybrid Guide" by John Kavulak.

DRAWINGS BY J. J. RILEY

John Riley has kindly provided A.N.O.S. Council with a series of watercolour prints of his work. These prints are available from Mr Bob Napier, Honorary Treasurer, A.N.O.S., P.O. Box C106, Clarence Street, Sydney, N.S.W. 2000. More information of this offer is available from the advertisement in this issue.

AUTUMN SHOW AT DUNGOG

Walter T. Upton

The Third Orchid Glenn Nursery Open Day and Show at the Dungog Showground on Sunday, 17th May, 1992, was a most successful event. Each year this all important happening is better and bigger than the previous year, making it now one of the most important occasions for the real orchid lover. Everyone who is any one in the orchid community, particularly the native orchid buff, was there. They came from Victoria and all the important orchid towns in New South Wales, right up the east coast to Queensland, plus a small contingent from Canberra. A number of Native Societies came by the busload.

It is a most happy affair being a social occasion as well as a serious show. It really starts the afternoon before when the hall is being prepared to receive show entries and the various commercial stands, everyone is in a gay mood and this is carried on into the evening. At the Dungog Bowling Club sixteen enthusiasts had a Chinese Banquet, a most merry occasion, we all went in the club as guests of Ken and Noelene Russell, I only hope Ken is still a member. A few others drove all the way out to Barrington House for dinner and "different sort of evening", but I am assured they enjoyed it greatly.

The weather was kind for the open day and show, the many commercial stands were both inside the hall and out. Business was quite brisk from opening time, you could buy anything from orchids to bags of bark. Most exotic genera of extremely high quality were being offered as well as all the very latest in native hybrids, seedling to mature flowering plants as well as flasks.

The Show was in two parts:–

1. Australasian Native Orchids .... 14 Classes
2. Non-Australasian Species and Hybrid Orchids .... 14 Classes

Both parts were very well represented with orchids of high quality. The exotic show was judged by the Orchid Society of N.S.W. and the native show by A.N.O.S.

A native show at this time of year is most exciting as many flowers exhibited are not normally seen at our spring shows.

Of particular note were the great number of hybrids using both warm and cool growing natives together, we have come a long way in this kind of hybridising. The flowers were most colourful and many are cool to cold growing despite having *Dendrobium bigibbum, D. affine, D. canaliculatum* and such like in their parentage. Many fine clones of *D.* Hilda Poxon, *D.* Sunglow and those with *D.* Ellen in their parentage were seen. Most colourful, florific and well displayed flowers on upright racemes.

The Champion Native Species or Hybrid was Mike Harrison's *D.* Red Ballerina (Plate 21). A superb clone with four arching racemes well above the foliage with a total of 32 vibrant flowers of excellent shape, well proportioned and of good habit of raceme. The Reserve Champion was Neil Finch's *D.* Peewee (Plate 22), although only a small plant it carried four large flowers on an arching raceme. The colour was a very intense deep magenta purple all over, I think we will be seeing more of this plant in the future. There were too many classes at the show to describe all winners, but I must mention the winner in Class 1, Best *Dendrobium* Hybrid with *D.* Ellen in its parentage. Owned by Ken Russell, *D.* Aussie Treat was a compact plant with numerous medium sized and very appealing colourful flowers with dark reddish markings all over.

If you missed the event this year, (it's more than just a show and open day) make sure you come next year, May, 1993. It will keep you up to date, you can buy the very latest in orchids, you can discuss culture or any other subject intelligently with those who know and at the same time crack a joke with a mate you have not seen for a while. Tea, coffee and other refreshments are available, I can recommend the very tender steak sandwich with onions from the barbecue.

To Ken and Noelene Russell our appreciation, you have really started something, something big that must continue, it is a most important event for the orchid calendar.

For those who want a day out Dungog is only three hours from Sydney, the drive is through some of the most beautiful country in Australia, the whole district is steeped in history, being settled in the early 1800's. Call in at the Paterson Court House (1858–63) on your way home, it's now a museum and is open on a Sunday from 1 p.m. to 5 p.m. The Rev. H. M. R. Rupp was rector at Paterson and did a lot of orchid botanising there.

FOURTH ANNUAL A.N.O.S. AUTUMN SHOW

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The time was April 5, the weather was warm and sunny for the show hosted by Warringah Group and held at Roseville Chase. there was much concern whether there would be enough plants in flower, but the Australasian orchids, which often miss shows, were there to brighten the scene. Phil and Yvonne Spence came to the rescue with 42 plants.

The Grand Champion and also the Champion Species was Gerry Walsh's *Dendrobium schneiderae* var. *major*. This was awarded an HCC/ANOS and an ACC/ANOS and now has the clonal name 'The Major'. It had nine racemes of pale yellow-green unblemished flowers.

Champion Hybrid and Ira Butler Trophy winner was *D.* Hilda Poxon, belonging to David Floyd.

Mike Harrison's *Liparis reflexa* was a perfectly presented plant and was awarded Champion Specimen.

Outstanding eyecatchers among the Class winners, were the little beauties *D. leavifolium* and *D. cuthbertsonii* 'Apricot Glow' (see rear cover) of P. and Y. Spence. The latter also was awarded an ACC/ANOS.

The glistening white flowers of Darryl Smedley's little *Cadetia dianantha,* took the eye. Two plants that could not be missed as one entered the door were the charming Australasian hybrids *Dendrobium terrestre* X *D. stratiotes* (1st) and the huge specimen of *D.* New Guinea (2nd), covered in flowers.

Ron Wheeldon's *D. dichroma* 'Yellow', a large trailing plant was covered with bright yellow flowers. Some other eyecatchers were Mike Harrison's *D. capituliflorum* (1st in its Class), Bill Kennewell's *Oberonia titania* and the two unusual plants, Phil Spence's *Dendrobium hellwigianum* and Ron Wheeldon's *Bulbophyllum nitidum.*

The Class for *Dendrobium bigibbum* had a number of good entries, R. Phillip's plant gaining a first and Darryl Smedley's second. An outstanding plant was Darryl Smedley's *D. phalaenopsis* 'Clifton' AM/QOS which had been selfed from one from Tanimbar Island, but unfortunately it had only a few flowers out. These were large, well shaped, the petals and sepals white at the centre shading to bright pink, with a darker pink labellum.

The show was judged to be successful after all, thanks to the hard work of Show Marshall, Chris Arnott and Show Secretary, Bob Lowe, all those who brought plants and those who visited and of course the judges.

NATIVE ORCHID RESEARCH

Recent Orchid Literature referring to Australasian native orchids.

ANATOMY

Irwin, B., 1991. The Labellum of *Gastrodia cunninghamii.* New Zealand Naitve Orchid J., 38: 6–7.

MYCORRHIZAE

Warcup, J. H., 1991. The *Rhizoctonia endophytes* of *Rhizanthella Orchidaceae.* Mycol. Res., 95(6): 656–9.

POLLINATION AND REPRODUCTIVE BIOLOGY

Cropper, S. C. and Calder, D. M., 1990. The floral biology of *Thelymitra epipactoides (Orchidaceae)* and the implications of pollination by deceit on the survival of this rare orchid. Pl. Syst. Evol., 170(1–2): 11–27.

Dafni, A. and Bernhardt, P., 1990. Pollination of terrestrial orchids of southern Australia and the Mediterranean region; systematic ecological and evolutionary implications. In Hecht, M. K. Wallace, B. and Macintyre, R. J. (eds.). Evolutionary Biology 24: 193–252.

TAXONOMY AND DISTRIBUTION

Bates, R., 1991. New names for some well known South Australian orchids. Native Orchid Soc. S. Austral. J., 15(50): 45–7.

Dixon, K. W., Pate, J. S. and Kuo, J., 1990. The Western Australian fully subterranean orchid, *Rhizanthella gardneri.* In Arditti, J., (ed.) Orchid biology, reviews and perspectives, 5. Portland, Oregon, Timber Press, pp.37–119.

Hatch, E. D., 1991. *Corybas rotundifolius* (J. D. Hooker) H. G. Reichenbach F., 1871. New Zealand Native Orchid Group J., 38: 4–5.

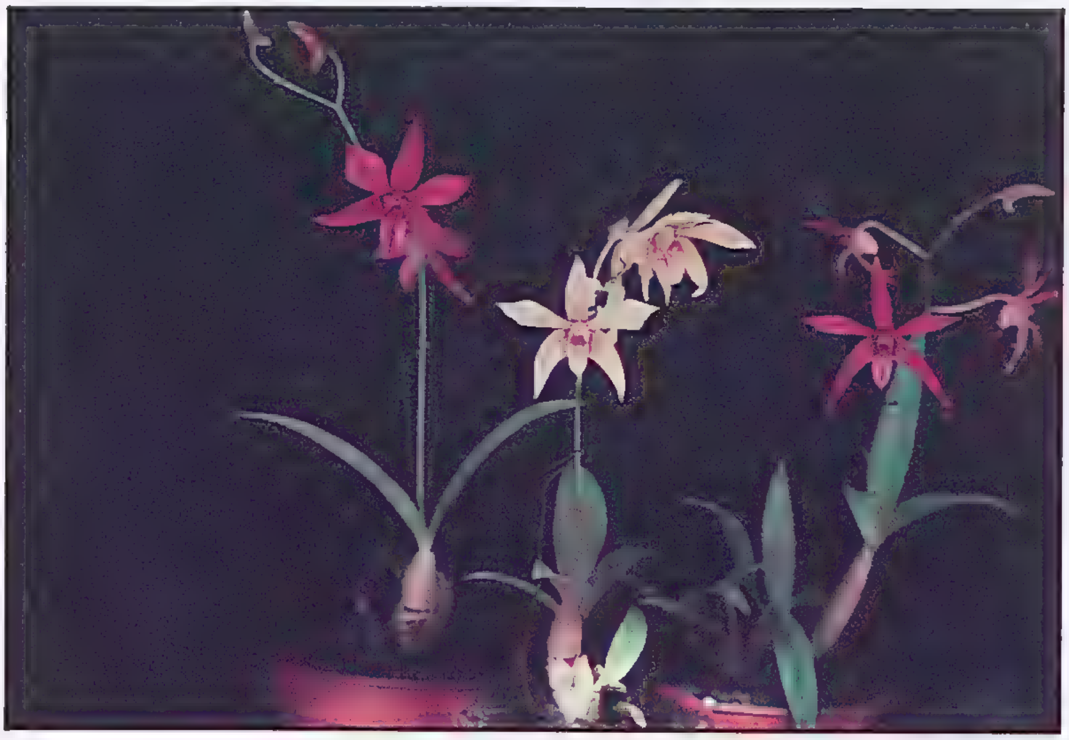

Plate 20:
Dendrobium
'Brinawa'.

Photo:
Laurie Jarvis.

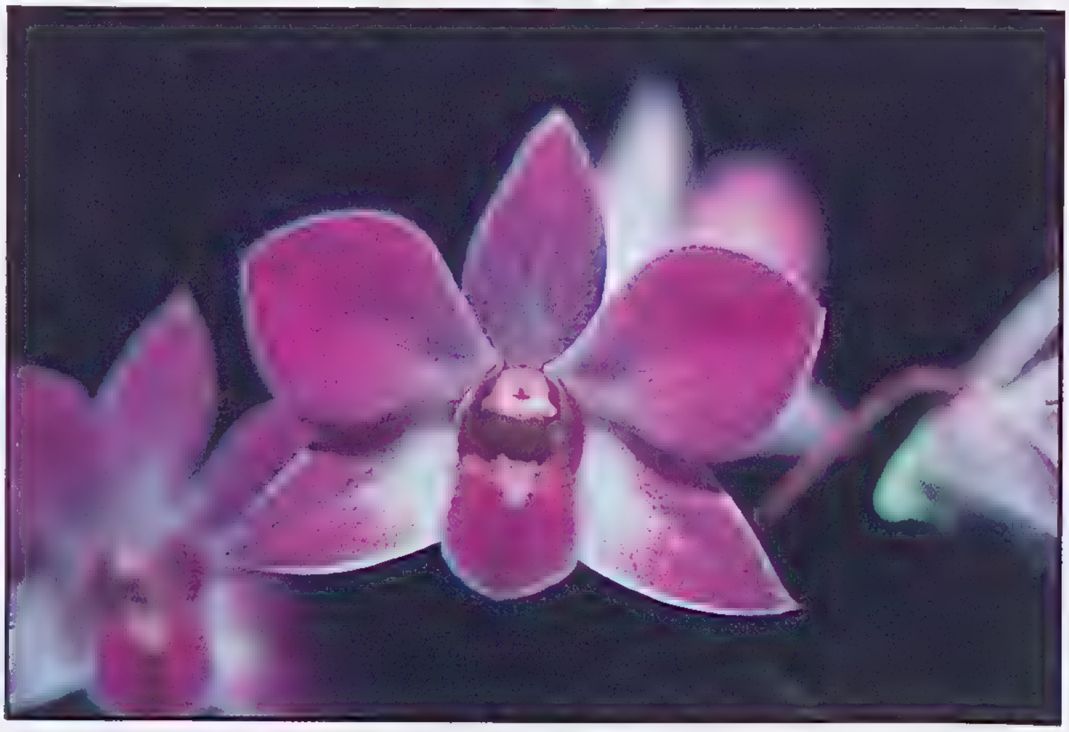

Plate 21:
Dendrobium
'Red Ballerina'.

Photo:
Denis Wood.

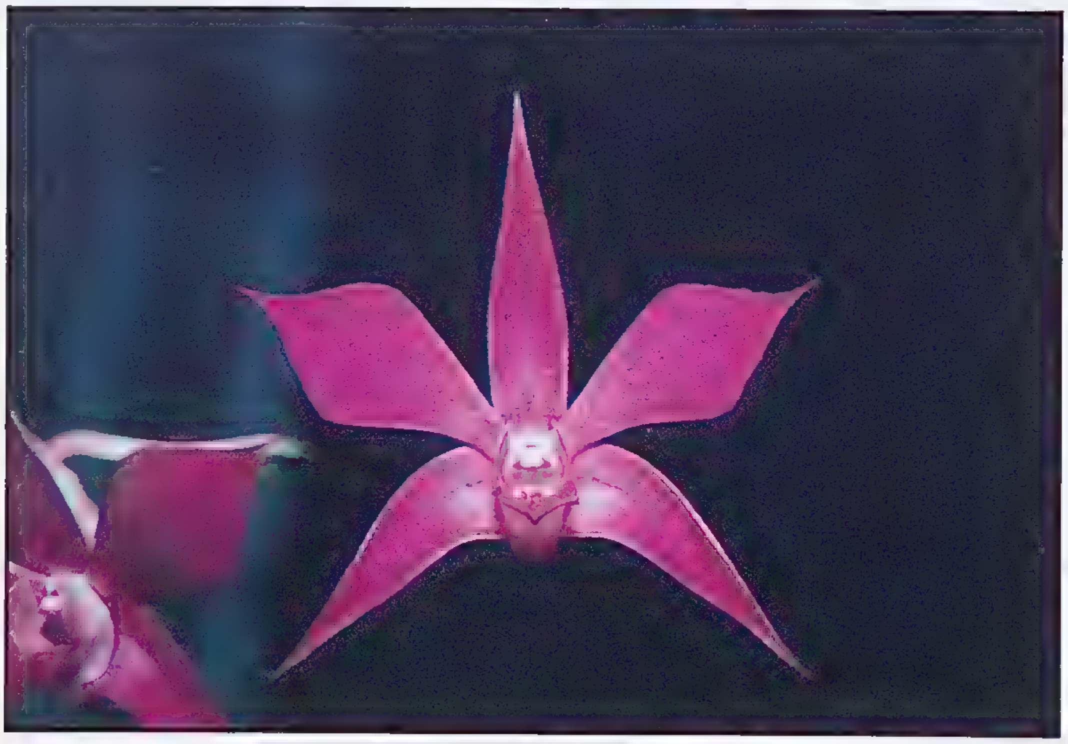

Plate 22:
Dendrobium
'Peewee'.

Photo:
Denis Wood.

THE USE OF POLLINATORS IN THE TAXONOMY OF SEXUALLY DECEPTIVE ORCHIDS IN THE SUBTRIBE *CALADENIINAE (ORCHIDACEAE)*

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In his recent forthright criticism of the taxonomic changes made to Australian *Orchidaceae* by Clements and Jones (Clements, 1989; Clements and Jones, 1990; Lavarack 1991) challenged the use of differences in pollinators as a taxonomic tool. He did this on two grounds. Firstly, that there have been few studies on pollinators and these have failed to show pollinator specificity for different morphological forms of orchids. Secondly, that insect taxonomy itself is poorly understood thereby making pollinator information difficult to interpret and of reduced value.

More recently Jones (1991) has published 108 new names for Australian orchids using similar taxonomic criteria to those criticised by Lavarack (1991). Jones (1991) highlighted the value of specific insect pollinators for distinguishing species in many genera of terrestrial orchids in the subtribe *Caladeniinae* including *Arthrochilus* F. Muell., *Chiloglottis* R. Br., *Drakaea* Lindley and *Caladenia* R. Br. section *Calonema* Bentham. He indicated that many species in these genera had evolved one to one relationships in which only the males of a single insect species are attracted for pollination by the mechanism of sexual deceit, or pseudocopulation.

The importance of specific pollinators for orchid taxonomy is that they provide a reproductive barrier between closely related species which might otherwise hybridise and lose their genetic integrity. It is well known that many orchids hybridise readily if crossed artificially and although many natural hybrids are known, most are uncommon or rare (Bates, 1985). Therefore barriers to hybridisation must exist in nature and may include differences in habitat, flowering times or pollination mechanism, including pollinators (Levin, 1978).

Stoutamire (1974, 1975) was the first to observe that many species of *Caladeniinae* are exclusively pollinated by male wasps of the subfamily *Thynninae,* commonly known as flower wasps. In most cases he found each orchid species attracted only one species of wasp, which effects pollination while attempting to carry off or mate with the labellum of the flower. Males are attracted by odours which appear to mimic the sex pheromones normally dispersed by receptive females. These imitation pheromones, or kairomones, are emitted by glands on the orchid labellum, or the tips of the petals and/or sepals. The labellum mimics the shape and/or colour of the wingless Thynnine female. The similarity of the mimic to the model varies from barely recognisable to human eyes in many spider orchids *(Caladenia* section *Calonema)* to remarkably insect-like in some *Chiloglottis* species (e.g. *C. formicifera* Fitzg.).

However, Stoutamire (1975, 1983) noted some apparent exceptions to pollinator specificity in sexually deceptive *Caladeniinae. Caladenia falcata* (Nicholls) M. Clements et Hopper and *C. barbarossa* H. G. Reichb. both attracted males of the same wasp in baiting trials and hybrids between them are known. He also noted that *Caladenia dilatata* R. Br. appeared to attract different wasps in different geographical areas, suggesting that geographical replacement of pollinators may occur. In *Chiloglottis gunnii* Lindley he noted there were at least four morphological forms which consistently attracted different male wasps (Stoutamire, 1975). These "pollinator races" led him to suggest there may be several cryptic species in *C. gunnii* sensu lato.

This suggestion has been taken up in recent taxonomic work (Carr, 1991; Jones, 1991) in which sexually deceptive taxa with multiple pollinators, such as *C. dilatata* sensu lato and *C. gunnii* sensu lato, have been interpreted as complexes of previously unrecognised species, each with a specific pollinator. Many of the new species are morphologically very similar (Carr, 1991; Jones, 1991), the key difference for pollination being the, as yet unidentified, kairomones used to attract pollinators. This close morphological similarity between species poses great difficulties for the taxonomist. Information on specific pollinators therefore provides important evidence for elucidating species complexes in sexually deceptive taxa (Jones, 1991). Similarly, studies by Paulus and Gack (1990) on the sexually deceptive Mediterranean genus *Ophrys* have shown that many forms previously regarded as subspecies have different specific pollinators, are therefore reproductively isolated and warrant recognition as species.

Thus, there is a great need for a better understanding of pollinators, pollination mechanisms and kairomones in the *Caladeniinae*. In particular, the key assumption of a one to one relationship between orchid and pollinator needs to be thoroughly tested. A set of criteria is also needed for proving that two orchid variants are reproductively isolated by pollinators.

This paper summarises the results of investigations on the specificity of pollinators of *Caladeniinae* found in New South Wales. The studies had two aims:–

1. to determine the pollinators of morphological variants in four species complexes; and
2. to determine if pollinators can be used to reliably distinguish two closely related orchid taxa as species.

The following pairs of species were studied:–

Caladenia tentaculata Schldl. and *C. phaeoclavia* D. Jones (*Caladenia dilatata* R. Br. complex);

Chiloglottis valida D. Jones and *Ch. pluricallata* D. Jones (*Ch. gunnii* Lindley complex);

Ch. trilabra Fitzg. and *Ch. seminuda* D. Jones (*Ch. reflexa* (Labill.) Druce complex); and

Ch. formicifera Fitzg. and *Ch. platyptera* D. Jones (*Ch. formicifera* complex).

Only the broad results of this work are given below; a more detailed account will be published elsewhere.

METHODS

Methods for attracting pollinators were developed from the baiting technique of Stoutamire (1983) and the studies of Peakall (1990) on the behaviour of *Zaspilothynnus trilobatus* Turner, the thynnine pollinator of *Drakaea glyptodon* Fitzg. One or several bait flowers mounted in a vial of water on a test tube rack werre placed on the ground at the normal height in suitable habitat. Flowers were exposed at each site for only 3 or 5 minutes as there is a rapid response to flowers by wasps if they are present in the area (Peakall, 1990). The flowers were then moved at least 20m to a new site. Visiting wasps were captured with a large insect net dropped over the flowers. As most wasps attracted to flowers do not complete the full behavioural sequence leading to pollination (Peakall, 1990), wasps were only regarded as being attracted by a flower if they were clearly orienting to it, i.e. landed on the flower or stem, or flew in a zig zag path up to it and appeared to investigate it. The behaviour of wasps on the labellum was observed to determine whether they were capable of removing or depositing pollinia.

Where possible, up to 20 wasps were collected at each locality to test for specificity. Large samples were not always possible for scarce pollinators and as wasp distribution is patchy, exposures often had to be made at 20 to 40 sites at each locality. Specimens of wasps were lodged with Dr G. R. Brown at the Biological and Chemical Research Institute (B.C.R.I.) of N.S.W. Agriculture at Rydalmere, Sydney. Voucher specimens of orchids from populations used in this work have been lodged with the Australian National Botanic Gardens, Canberra and include the types of *C. phaeoclavia* and *C. platyptera*.

Two types of tests were made to demonstrate the distinctness of pollinators in closely related orchid taxa: choice experiments and reciprocal baiting.

i Choice experiments
In choice experiments flowers of two similar taxa were placed simultaneously at the same site in the field and the wasps attracted to each were captured. The flowers were placed 30 to 50cm apart so their odour trails sampled the same habitat, but wasps attracted by the odour of one flower would not be confused by the visual stimulus of the other being too close. Some confusion between visual stimuli was apparent if flowers were closer than about 20cm.

ii Reciprocal baiting
Reciprocal baiting was used to examine the specificity of pollinators for geographically disjunct orchid taxa with different pollinators in each region. Flowers from one region were transported to the other for choice experiments and vice versa. Reciprocal baiting aimed to determine if each of the two similar orchids could attract the normal pollinator of the other.

RESULTS

i *Caladenia phaeoclavia* D. Jones/*C. tentaculata* Schldl.

The possibility that a second taxon existed within populations of *C. tentaculata* Schldl. in the Bathurst-Orange area was revealed when plants from different localities attracted thynnines from two genera, *Thynnoides* and *Lophocheilus* (Table 4). Choice experiments were conducted at five locations on the central west tablelands and

Orchid species	Primary pollinator(s)	Suspected minor pollinator(s)	Other thynnines attracted
Caladenia			
C. tentaculata	*Thynnoides* spp.		
C. phaeoclavia	*Lophocheilus anilitatus*		
Chiloglottis			
C. pluricallata	*Neozeleboria impatiens*		
C. valida	*N. nitidula/N. monticola*		
C. trilabra	*N. proxima*	*N.* new species near 25	
C. seminuda	*N.* new species 29[1]	*Asthenothynnus westwoodi*	*Rhagigaster unicolor* *Eirone* sp. nov.
C. formicifera	*N.* new species 41	*N. monticola*	
C. platyptera	*N.* new species 40		

[1] Undescribed species numbers as designated by Dr G. R. Brown, B.C.R.I.

Table 4. Summary of male thynnine wasps attracted to four pairs of closely related sexually deceptive *Caladenia* and *Chiloglottis* species in New South Wales.

slopes with flowers of *C. tentaculata* from four localities (Weddin Mountains, Bumberry Range, Yetholme, Mullion Creek) and *C. phaeclavia* from three (Yetholme, Mullion Creek, Batlow). In all tests *C. tentaculata* attracted only one or more of three species of *Thynnoides, T. pugionatus, T. rufithorax* and *T. fumipennis,* while *C. phaeoclavia* attracted only *Lophocheilus anilitatus.* Both the *Thynnoides* and *Lophocheilus* attempted to mate with the labellum (Plate 23) and collected pollinia on the thorax.

Generally only one pollinator genus was present at each locality. However, in the Mullion Range north of Orange, both *Thynnoides* and *Lophocheilus* were present and visited only one set of flowers as elsewhere. Twenty specimens of *Thynnoides* spp. attracted at three localities and 14 of *Lophocheilus anilitatus,* from four localities, are lodged at B.C.R.I.

C. phaeoclavia and *C. tentaculata* are very similar morphologically with some plants difficult to assign to one taxon or the other without attracting the pollinator. They occur in discrete colonies and populations, but share similar habitats and may grow in close proximity at some localities. In central western N.S.W. *C. phaeoclavia* is confined to tableland areas, extending to higher altitudes than *C. tentaculata;* up to 1200m on Mt Canobolas. *C. tentaculata* extends to lower altitudes than *C. phaeoclavia* on the western slopes. *C. phaeoclavia* typically has dark reddish brown clubs on the sepals and petals compared with the yellowish brown clubs of *C. tentaculata.* It also flowers earlier than *C. tentaculata* where the two grow together, not later as stated in Jones (1991). *C. phaeoclavia* is usually shorter (as low as 8–10cm), but overlaps in height with *C. tentaculata,* which is usually 20cm or more high.

ii *Chiloglottis valida* D. Jones/*C. pluricallata* D. Jones

Individual baiting trials with flowers of *C. valida* from a range of localities (Orange, Sunny Corner, Oberon, Carabost, Batlow) attracted wholly black wasps identified as *Neozeleboria monticola* or *N. nitidula* at high altitudes where the orchids occur (Plate 25). A total of 29 wasps attracted to *C. valida* at seven locations are lodged at B.C.R.I. Removal of pollinia on the thorax was observed on several occasions.

When two pairs of flowers of *C. valida* and *C. pluricallata* were exposed in separate choice experiments in Kanangra-Boyd National Park, *C. valida* attracted 18 *N. nitidula* or *N. monticola* while *C. pluricallata* attracted 10 *N. impatiens,* a very different reddish wasp with yellow spots

(Table 4). At some sites both wasps were present, at others only one was attracted. *N. impatiens* was not observed to remove pollinia, but it exhibited strong pseudocopulatory behaviour on the labellum and was the correct size to be a potential pollinator.

The two orchids often grow in close proximity, at times loosely intermingled with each other. They overlap in flowering times, but *C. valida* commences flowering earlier and has largely finished when *C. pluricallata* is at its peak. In Kanangra-Boyd National Park, the flowers of *C. pluricallata* are slightly smaller and a darker reddish brown than those of *C. valida,* which are greenish brown. *C. pluricallata* differs mainly in having more numerous labellum calli.

iii *Chiloglottis seminuda* D. Jones/*C. trilabra* Fitzg.

C. seminuda and *C. trilabra* are two dissimilar species in the autumn flowering *C. reflexa* (Labill.) Druce group. *C. trilabra* generally occurs at higher altitudes and on higher fertility soils than *C. seminuda,* which grows on the Central Coast and sandstone soils of the Blue Mountains. Numerous colonies of both species occur in a mosaic on shaley ridgetops east of Mt Werong. Extensive individual baiting trials with *C. trilabra* showed it attracts the common wasp *Neozeleboria proxima* at seven localities in the central tablelands and also at Batlow on the southern tablelands. Forty-seven wasps from these collections are lodged at B.C.R.I. *N. proxima* is a small black wasp usually with 1 to 3 pairs of oval-shaped yellow spots on either side of the abdomen.

At the initial examination of the Mt Werong colonies, prior to the description of *C. seminuda* by Jones (1991), it appeared that three species of *Chiloglottis* might be present on the basis of morphological variation; *C. trilabra* (plate 28) and two undescribed taxa. The two undescribed variants differed mainly in the extent of sessile glands (Jones, 1991) towards the labellum apex beyond the major sessile gland. Form A has few or no sessile glands (Plate 26), while Form B has them extending about halfway to the apex (Plate 27). Form B was most abundant; Form A occurring at only one site. The sessile glands extend right to the labellum apex in *C. trilabra.*

Initial choice experiments at Mt Werong attracted black wasps with yellow spots, which appeared to be *N. proxima,* to all three taxa. However when flowers of the three taxa were transposed to Mt Canobolas near Orange and used in choice experiments, *C. trilabra* attracted only *N. proxima,* but Forms A and B attracted only a smaller, heavily spotted wasp from a different genus, *Asthenothynnus westwoodi* (Table 4). Flowers of Forms A and B from Mt Banks also attract *A. westwoodi* on Mt Canobolas, which is outside the known habitat and distributional range of these forms.

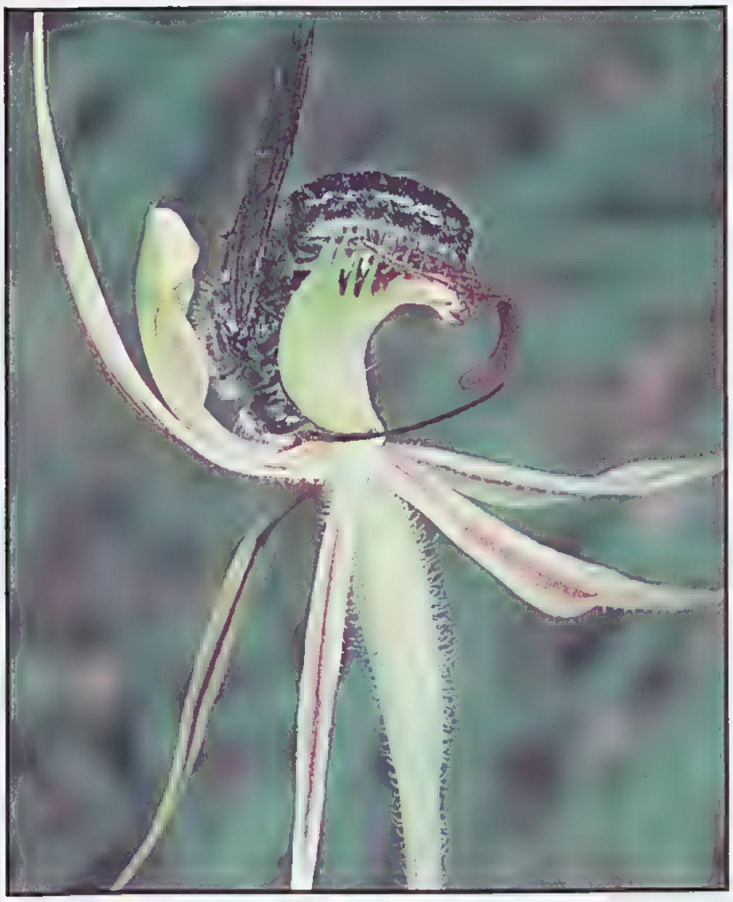
A second set of choice experiments was conducted at Mt Werong and a total of 38 wasps attracted to all forms was collected. Close examination of the wasps revealed two taxa: *N. proxima* and a second very similar undescribed species (*Neozeleboria* new species 29; G. R. Brown, pers. comm.). *N. proxima* was only attracted to *C. trilabra,* and Forms A and B both attracted only the new species. It differs from *N. proxima* in consistently having 3 or 4 pairs of paler yellow abdominal spots, which are rhomboidal in shape rather than oval. Forms A and B from Mt Werong also attracted the new *Neozeleboria* when exposed near Hampton and at Limeburners Flat south of Mt Werong.

During the extensive baiting with *C. seminuda* and *C. trilabra,* occasional wasps of other species were attracted to both orchids (Table 4). At Mt Canobolas a single specimen of a large thynnine, *Rhagigaster unicolor* visited *C. seminuda.* As with the *Neozeleboria* spp., the *Rhagigaster* displayed vigorous copulatory behaviour on the labellum, but was too large to be an effective pollinator; its thorax did not fit below the column. At Mt Werong, a single specimen of a new thynnine in the genus *Eirone* was also attracted to *C. seminuda.* Similarly, at both Mt Canobolas and Mt Werong a new species of *Neozeleboria* (new species near 25) was attracted in low numbers to *C. trilabra* and displayed typical copulatory behaviour.

iv *Chiloglottis formicifera* Fitzg./*C. platyptera* D. Jones

C. formicifera occurs from central coastal N.S.W. to inland south-eastern Queensland with disjunct populations on scattered ranges inland of the Great Dividing Range. Inland and coastal populations differ slightly in the shape of the labellum apex and clavoid lamina calli (D. L. Jones, pers. comm.). *C. platyptera* is a closely related species, recently described from Barrington Tops east of Scone (Jones, 1991). It differs from *C. formicifera* mainly in its greatly enlarged column wings.

Reciprocal baiting experiments were performed with flowers of *C. formicifera* from the Hervey Range east of Peak Hill and Waterfall south of Sydney and *C. platyptera.* In the Hervey Range, local flowers of *C. formicifera* and flowers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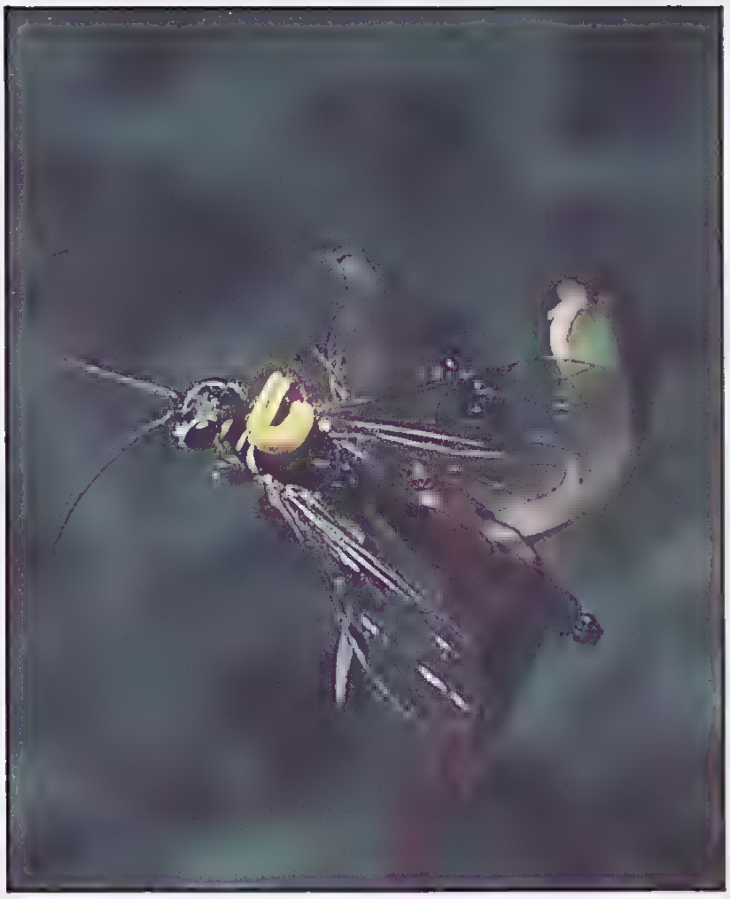
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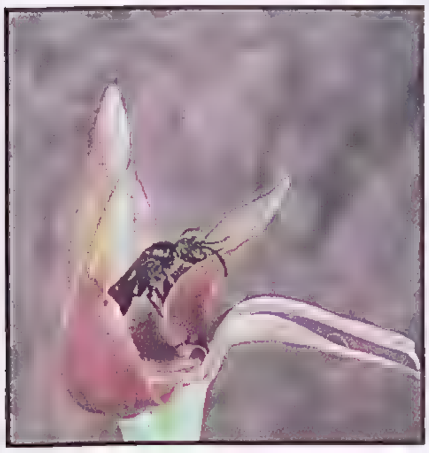
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Plate 23: *Lophocheilus anilitatus* on *Caladenia phaeoclavia.*

Plate 24: *Neozeleboria cryptoides* with pollinia of *Chiloglottis trapeziformis.*

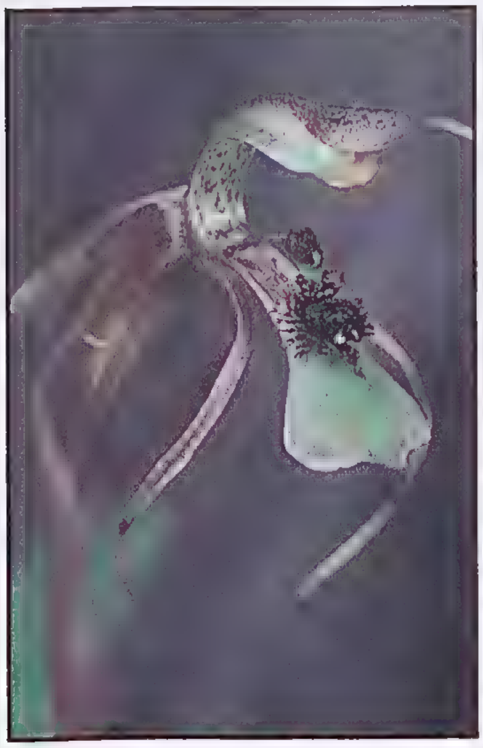
Plate 25: *Neozeleboria monticola* on *Chiloglottis valida.*

Plate 26: *Chiloglottis seminuda* Form A, Mt Werong.

Plate 27: *Chiloglottis seminuda* Form B, Mt Werong.

Plate 28: *Chiloglottis trilabra* Mt Werong.

Photos by C. Bower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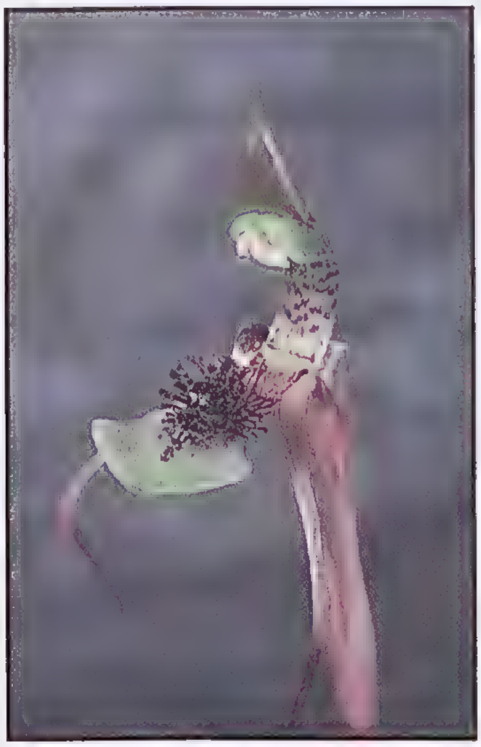
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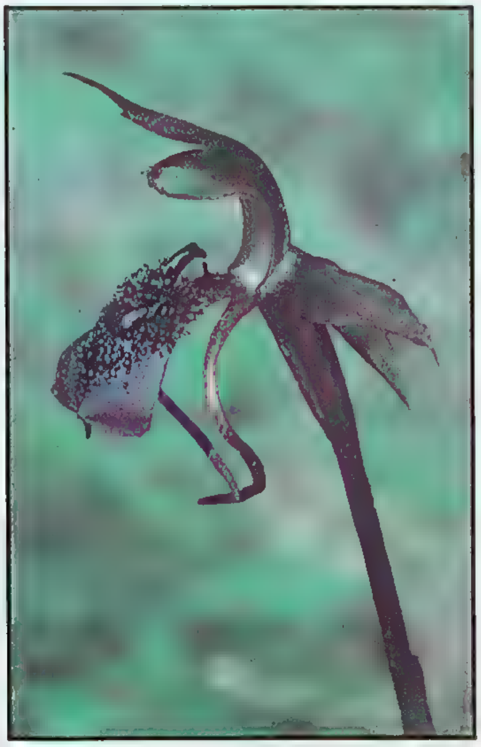
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from Waterfall were equally attractive to an undescribed species of *Neozeleboria* (new species 41) in choice experiments, but none went to *C. platyptera.* Of 59 wasps attracted in 40 three minute exposures, 25 went to *C. formicifera* from Waterfall and 34 went to the local plants. One wasp was observed to go first to a Hervey Range flower, then to one from Waterfall and two did the reverse. Despite extensive baiting in the Waterfall area only two wasps were attracted. The one able to be captured was identified as *N. monticola,* the pollinator of *C. valida.* Two specimens of *N. monticola* were also attracted to *C. formicifera* from Mt Cameron in the Blue Mountains when exposed near Lithgow in an individual baiting trial.

In choice experiments at Barrington Tops with flowers of *C. formicifera* from the Hervey Range and local *C. platyptera,* 14 wasps were attracted to *C. platyptera* and none to *C. formicifera.* All were a new species of *Neozeleboria* (new species 40).

DISCUSSION

The observations and experiments reported above confirm that a high degree of pollinator specificity occurs in sexually deceptive *Caladeniinae.* Field choice experiments and reciprocal baiting clearly demonstrate which morphological variants have different pollinators and therefore are reproductively isolated. These techniques can elegantly separate morphological variation between orchid species from that within species. The results justified the description by Jones (1991) of *C. phaeoclavia, C. pluricallata, C. seminuda* and *C. platyptera* as new species. They also show that two morphologically distinguishable forms within *C. seminuda* and *C. formicifera* are not reproductively isolated by pollinators and represent variation within species.

The data also support the view that some older established taxa in the sexually deceptive *Caladeniinae,* such as *C. gunnii* sensu lato and *C. dilatata* sensu lato, in fact consist of complexes of cryptic pollinator-specific species (Stoutamire, 1975; Carr, 1991; Jones, 1991). Species within these complexes may be difficult to distinguish morphologically, e.g. *C. valida* and *C. pluricallata,* and *C. phaeoclavia* and *C. tentaculata.*

Only one species of thynnine was attracted to *C. phaeoclavia, C. pluricallata* and *C. platyptera* in conformity with the concept of a one to one orchid/pollinator relationship. However, as suggested by Stoutamire (1975, 1983) some sexually deceptive orchids may attract more than one thynnine wasp species. Three reasons may account for this and it is appropriate to discuss them in some detail.

1. Thynnine taxonomy

One case of multiple pollinators, the attraction of *N. monticola* and *N. nitidula* to *C. valida* may be an artefact of imperfect thynnine taxonomy. The two species are difficult to distinguish reliably and may be synonymous (G. R. Brown, pers. comm.). Similar problems occurred with the *Thynnoides* species attracted to *C. tentaculata.* Five names initially assigned to the specimens, *T. pugionatus, T. gracilis, T. rufithorax, T. mesopleuralis* and *T. fumipennis,* have been reduced to three, as G. R. Brown (pers. comm.) now considers *T. gracilis* is synonymous with *T. pugionatus* and *T. mesopleuralis* with *T. rufithorax.* The taxonomy of many genera in the *Thynninae* requires revision and many species remain to be described. In particular, *Neozeleboria,* the main genus of pollinators for *Chiloglottis,* contains over 40 undescribed species (Table 4).

Lavarack (1991) suggested difficulty in interpreting pollinator data may arise from the incomplete state of insect taxonomy. Although problems with thynnine taxonomy were encountered in this study, they did not preclude useful conclusions being made. Most thynnine species are quite distinct, including the undescribed ones. With appropriate experiments and the co-operation of an experienced insect taxonomist, pollinators can assist in unravelling the taxonomy of the *Caladeniinae.*

2. Geographical pollinator replacement

Multiple pollinators may also occur if there is geographical replacement of pollinators in widespread orchid species (Stoutamire, 1983). The possibility of geographical pollinator replacement exists in *C. formicifera* between inland and coastal populations. *Neozeleboria* new species 41 is the pollinator of inland populations in the Hervey Range, while *N. monticola* was attracted on the coast and Blue Mountains about 250km to the east. However, insufficient thynnines have been attracted to *C. formicifera* in coastal areas to be confident that *N. monticola* is the pollinator to which it is primarily adapted.

Stoutamire (1983) observed geographical replacement of pollinators in *C. dilatata.* However, many new taxa have been recognised since then in *C. dilatata* sensu lato (Carr, 1991; Jones, 1991) and it is uncertain which of these Stoutamire tested. given the close similarity of taxa in the *C. dilatata* complex, it is likely that Stoutamire encountered several species with discrete pollinators, rather than one with different pollinators in different areas. Currently there is no good evidence that geographical pollinator replacement occurs in this species complex.

3. **Multiple attraction**

Attraction of multiple thynnines at one locality was found in *C. trilabra, C. seminuda* and *C. tentaculata.* In *C. trilabra* and *C. seminuda* one species greatly predominated in the collections, *N. proxima* and *N.* new species 29, respectively. The other wasps were attracted in low numbers and at few localities. However, *N.* new species 25 was attracted to *C. trilabra* at two localities and may be an alternative minor pollinator. Similarly, *Asthenothynnus westwoodi* was strongly attracted to *C. seminuda* on Mt Canobolas, which is outside the normal range of the orchid. *A. westwoodi* was able to pick up pollinia in the normal manner and could also be an alternative pollinator. However, this wasp has yet to be attracted to *C. seminuda* within its normal habitats and distribution. One *Eirone* sp. nov. and one *Rhagigaster unicolor* were also attracted to *C. seminuda.* The *Rhagigaster* was too large to effect pollination despite appropriate behaviour and along with the *Eirone,* may simply be an incidental visitor, whose pheromone bears a sufficent resemblance to that of the primary pollinator for some attraction to occur.

The situation with *C. tentaculata* is more complex and requires further investigation. three quite distinct *Thynnoides* species (G. R. Brown, pers. comm.) were attracted to morphologically similar plants of *C. tentaculata* without any obvious evidence of selectivity. However, the amount of data is insufficient to dismiss the possibility of cryptic taxa within *C. tentaculata* as it is currently understood. Nevertheless, it appears that *C. tentaculata* may be an example of a sexually deceptive orchid with multiple pollinators, in this case several species in one wasp genus.

These examples suggest that strict one to one orchid/pollinator relationships do not exist for all sexually deceptive *Caladeniinae.* However, orchids attracting multiple pollinators may still be reproductively isolated if the pollinators are unique visitors to the species, as in the examples of *C. tentaculata* and *C. phaeoclavia,* and *C. trilabra* and *C. seminuda.* It is clear that pollinator relationships may be complex in some sexually deceptive species and therefore caution is needed when designating orchid taxa as distinct species on the basis of limited pollinator data.

Criteria are therefore needed to guide:–

(a) the acceptance of attracted wasps as pollinators; and

(b) to reliably separate orchid species on the basis of those pollinators.

The following criteria are suggested:–

(a) **Acceptance of thynnines as pollinators**

1. Habitat and distribution
Wasps attracted outside the normal habitats and distribution of the orchid should be treated with caution (Stoutamire, 1983). The true pollinator(s) must occur in or adjacent to the habitat of the orchid and include the distribution of the orchid within its range.

2. Pollinator verification
Adams and Lawson (1988) proposed a set of criteria which should be met before an insect is accepted as a pollinator of an orchid:
— An insect without pollinia should be observed to enter a flower and leave with pollinia attached (Plate 24).
— An insect of the same species with pollinia attached should also be observed to place pollinia, or fragments of pollinia, on the stigma of another flower.
— It is essential that the orchid and the insects be collected and correctly identified.
Specimens should be lodged with appropriate herbaria and museums.

In the case of sexually deceptive orchids, observations of appropriate precopulatory or pseudocopulatory behaviour on the labellum and removal of pollinia by the insect are essential. While the observation of pollinia deposition on another flower is desirable, this is rarely possible given the brevity of wasp visits in the field. In any case, given the stereotyped nature of thynnine pseudocopulatory behaviour, a thynnine capable of correctly removing pollinia is also capable of pollinating a stigma.

3. Primary pollinator
Each thynnine-pollinated orchid can be expected to have one primary pollinator to which it is adapted in terms of kairomone composition and physical structure. However, there may also be one or more minor pollinators and a number of non-pollinating incidental visitors. The role and importance of each can only be determined if an adequate sample is collected for identification. Ideally, a sample of 20 or more wasps should be collected at each of several

dispersed localities. The most numerous and consistently attracted verified pollinator can be designated the primary pollinator (Table 4). In practice large samples may be difficult to obtain for some orchids.

(b) Criteria for using pollinators to distinquish orchid species

1. Choice experiments
   Choice experiments (see Methods) provide the best means of proving that two similar orchid taxa have different pollinators. Separate baiting trials with each taxon are open to the interpretation that the different wasps attracted simply represent multiple pollinators (Adams and Lawson, 1988), or geographically replacing pollinators of the same orchid species (Stoutamire, 1983). Choice experiments allow a direct comparison which shows clearly whether or not the two taxa attract the same insects. It is important to use several fresh flowers for bait, as attractiveness may be lost in old flowers and may vary in fresh ones (Peakall, 1990). Choice experiments were conducted by Stoutamire (1983) on some species of *Caladenia* and have been used extensively by Paulus and Gack (1990) in their investigations of the pollinators of Mediterranean *Ophrys* species.

2. Reciprocal baiting
   Reciprocal baiting is a variation of the choice experiment for allopatric (geographically separated) taxa. Flowers are transported between regions and the imported taxon is exposed in choice experiments with local flowers. This technique distinguishes between the hypotheses of geographical replacement of pollinators within a widespread variable orchid species and specific pollinators within two or more distinct geographically localised orchid species.

CONCLUSION

The field observations and experiments reported in this paper show that thynnine wasp pollinators of sexually deceiving *Caladeniinae* can be used to distinguish closely related orchid species for taxonomic purposes. Choice experiments and reciprocal baiting have revealed several new cryptic species in *Chiloglottis* and *Caladenia* (Jones, 1991), which were formerly regarded as part of the normal variation in other species. These superficially minor variants may be difficult to distinguish visually from closely related species, but are reproductively isolated from them and warrant taxonomic recognition.

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BOOK REVIEWS

ORCHID MONOGRAPHS, VOL. 6 — Revisions in *Coelogyninae* (*Orchidaceae*) IV. *Coelogyne* section *Tomentosae* by E. F. de Vogel and A Revision Of The Orchid Genera *Ania, Hancockia, Mischobulbum* and *Tainia* by H. Turner.

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This carefully crafted gem displays all of Wal Upton's vast knowledge of his subject; as a botanist, artist, photographer, master hybridist and above all, as a lover of his Australian native orchids!.

Chapters include: The Genus *Sarcochilus,* Descriptions of *Sarcochilus* species in Australia, Natural hybrid occurring in Australia, Intergenerics, Australian *Sarcanthinae* species hybridised with *Sarcochilus,* Pollination and seed raising and Culture. Then follow three appendices: *Sarcochilus* hybrids using only Australian indigenous parents registered to October, 1991. Hybrids with *Sarcochilus* and other Australian members of the subtribe *Sarcanthinae* and the last lists Abbreviations; Authors and Publications, References and Selected Bibliography, Conversion Chart, Glossary and Index.

The author discusses the genus *Sarcochilus* and follows with a detailed analysis of each Australian species with Citations, Synonyms, Description, Flowering Period, Distribution, Habitat, Culture, in Hybridisation and a list of hybrids.

The treatment of several species and some varieties display the author's careful, considered and conservative approach and will be appreciated by many readers.

I began by stating that the book is a "carefully crafted gem", those of you who have Wal's last work, *Dendrobium orchids of Australia* may appreciate what is in store for them!

We look forward with interest to see what genus is selected next.

M. J. Corrigan

IRA BUTLER TROPHIES FOR THE CHAMPION AUSTRALIAN ORCHID HYBRID OF THE YEAR

R. Rudkin

1981 *Dendrobium* Gloucester Sands .. L. Jarvis
A.N.O.S. Central Coast Spring Show

1982 *D.* Hilda Poxon .... W. & J. Upton
A.N.O.S. Warringah and Sydney Spring Show

1983 *D.* Star Of Gold .... F. & I. Chapman
A.N.O.S. Warringah and Sydney Spring Show

1984 *Sarcochilus* Aussie Weinman .... W. & J. Upton
A.N.O.S. Warringah Spring Show

1985 *Diuris* Pioneer .... B. Bates
Native Orchid Society of S.A. Spring Show

1986 *Dendrobium* Hilda Poxon .... W. & J. Upton
A.N.O.S. Warringah Spring Show

1987 *Sarcochilus* Melba .... S. Batchelor
A.N.O.S. Sydney *Sarcanthanae* Show

1988 *Dendrobium* Elegant Heart 'Jill' .... W. & J. Upton
A.N.O.S. Warringah Spring Show
D. Hilda Poxon 'Winifred Mary' .... N. Grundon
Awarded H.C.C./(Qld.O.S. and A.O.C.)

1989 *D.* Our Native 'Sunshine Coast' .... L. Grubb
Awarded A.M./(Q.O.S.)

1990 *D.* David Baver .... L. Jarvis
A.N.O.S. Autumn Show, Central Coast

1991 (*Caladenia latifolia* X *C. flava*) 'Harlequin' .... B. Bates
Native Orchid Society of S.A. Spring Show (Plate 16).

BOOK REVIEW

AUSTRALIAN TROPICAL ORCHIDS

By Bill Lavarack and Bruce Gray.

Publishers Frith & Frith Books, P.O. Box 581, Malanda, Queensland 4885.
ISBN 0 9589942 8 5. 235mm x 175mm, soft cover, 72pp, 116 colour plates.
Price: R.R.P. $12.95.

A delightful book, well produced and pleasing to the eye. Although small it is a wealth of knowledge and should be in the library of all native orchid enthusiasts.

It is the latest in a "Tropical" series which includes Australian Tropical Birds, Australian Tropical Reptiles and Frogs, Australian Tropical Reef Life, Australian Tropical Butterflies, Australia's Cape York Peninsula, Australia's Wet Tropics Rainforest Life.

Basically it is a collection of 116 superb colour photographs depicting 109 tropical orchids, chosen by the authors as representative. The text, however, it more than basic, being quite comprehensive. For each species mentioned the text includes notes on distribution including a simple map, habitat types, an indication of size, flowering season, conservation status and any features of interest. Notes on cultivation are also provided. The authors have not included detailed descriptions preferring to let the photographs speak for themselves.

The orchids are arranged in six habitat types each of which is illustrated with a large format photograph, accompanied by a description. The six types are: Wet Tropics Lowland Open forests, Wet Tropics Lowland Rainforests, Wet Tropics Upland Open Forests, Wet Tropics Upland Rainforests, Cape York Peninsula Open Forests, Cape York Peninsula Rainforests.

Many seldom seen native orchids are depicted, some extremely rare and endangered, such as the small leafless species *Aphyllorchis anomala* others include *Malaxis lawleri, Vrydagzynea paludosa, Calochilus holtzei* and *Bulbophyllum gracillimum.*

Not only is this book a quality production but is compiled by two well-known and respected orchid experts. Bill Lavarack is Senior Botanist with the Queensland National Parks and Wildlife Service and Bruce Gray is with the C.S.I.R.O. Division of Forest Research at Atherton.

This is a must for all native orchid lovers and is now available from the publishers. As an introductory offer for readers of this issue of *The Orchadian* the price includes postage within Australia.

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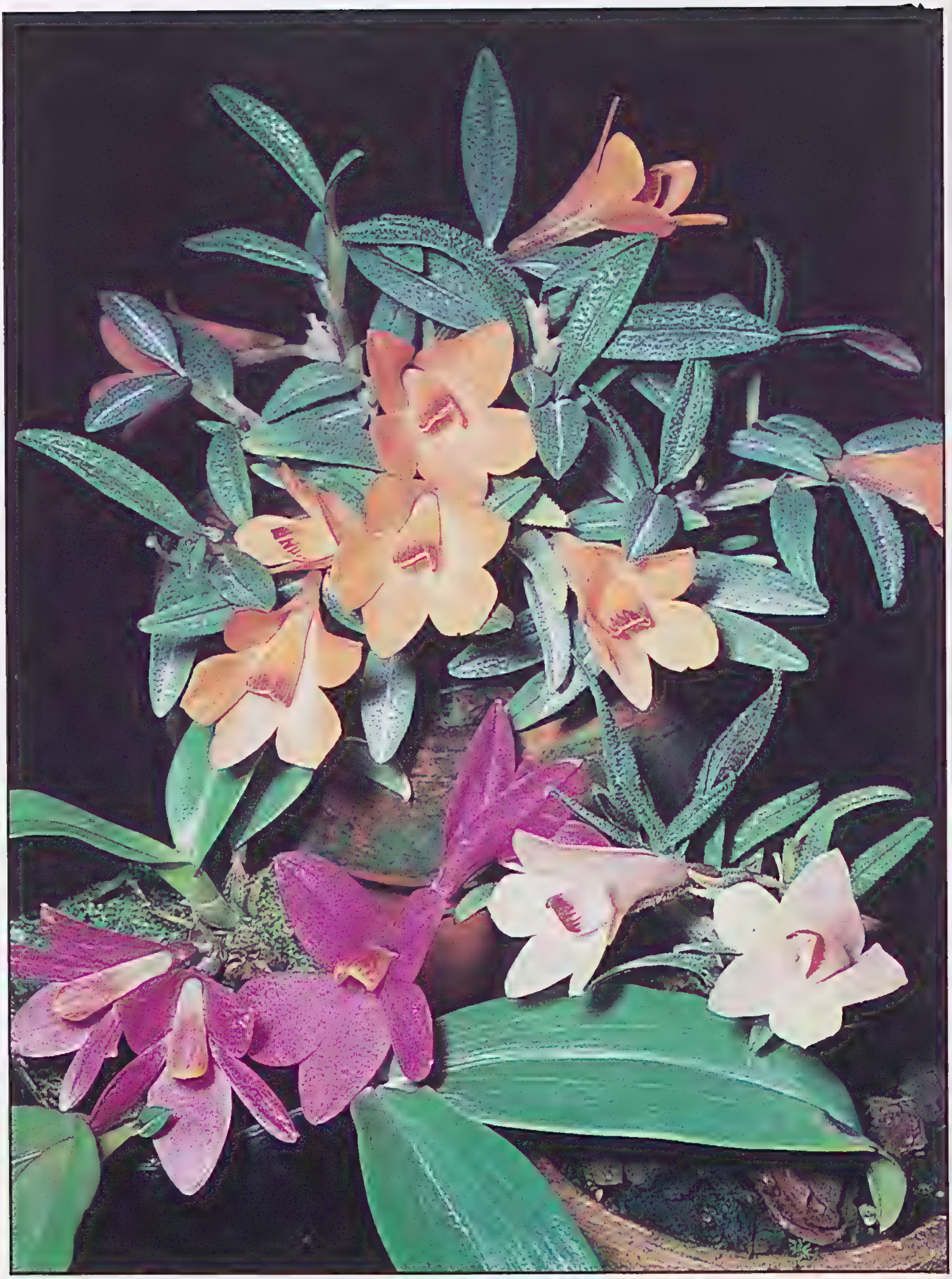

Dendrobium cuthbertsonii 'Apricot Glow' ACC/ANOS centre, paler form to right; *D. laevifolium* to left.

Owners: P. & Y. Spence Photo by D. Titmuss

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Summer 1992/93

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TALKING POINT

At the Annual General Meeting held in Gosford recently, Vice-President Michael Harrison spoke on the image of A.N.O.S. Council in some States. We have realised for a long time that A.N.O.S. Council has been centred in Sydney for far too long. We need a change, our image needs to be a national one, not a N.S.W. one. How do we achieve this?

May I quote to you from the original proposed constitution I wrote and presented to the initial meeting of 19 native orchid enthusiasts on 23rd March, 1963 when we agreed to organise an inaugural meeting. "The Australasian Native Orchid Society will comprise an Australasia-wide membership divided into State or District Branches and governed by a Committee comprised of two (2) members of each State or District Branch Committee".

A summary of the original intentions was that the governing body would comprise the President and Secretary of each State or District Committee. The governing body to meet at least once a year. In between, all business would be carried out by correspondence. All matters requiring approval of the governing body must be agreed upon in writing by a majority of the State or District Committees.

That was my thinking at the beginning and still is, but the problem is — How do we get other States involved? We have tried in the past to achieve Councillors from Victoria with the intent of the Council going to that State. We did in actual fact have a Victorian Councillor but due to pressure of work that person was unable to attend any meetings and the whole scheme fell through, not, I might add, because of a lack of enthusiasm.

Please, we need your views on this very important matter, we must go forward, not stagnate. I am sure we all appreciate the amount of input from New South Wales Councilors over the many years since our beginning, but fresh ideas would not go astray.

Another matter brought up at the A.G.M. which must be determined at the next A.G.M., is the Wallace Line motion. Personally I would prefer to forget the whole thing. It is hard enough to manage the Society within the present limits, imagine the problem if we had groups in Sulawesi or the Moluccas. This is more than just a plant problem. There is an excellent article in this issue by Greg Steenbeeke of Sydney Group "The Wallace Line Debate" and a letter from Bob Napier, I suggest you read them both and then join the debate.

By the way, I still need a lot of articles, large or small, technical, cultural or whatever, in order to keep *The Orchadian* up to standard and on time, I cannot do it alone.

Walter T. Upton

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Articles:
May be submitted to A.N.O.S. Inc., P.O. Box C106, Clarence Street, Sydney, N.S.W. 2000, or to the Editor or an Editorial Associate (see addresses below). Manuscripts may be typed, printed or submitted in electronic form on diskette. Good quality colour slides may be submitted with articles. All efforts will be made to return the slide(s) to the author(s) after use.

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GROWING AUSTRALASIAN DENDROBIUMS IN THE UNITED STATES

C. R. Ossian,
2805 Raintree Drive,
Carrollton, TX 75006 U.S.A.

"Let's see now, Australia . . . Australia . . . Oh yes . . . that place on the bottom of my globe where they have all those eucalyptus trees and kangaroos . . . and that odd fellow Paul Hogan . . . the guy with all the teeth in his smile who seems preoccupied with 'putting a shrimp on the Barby'. Orchids . . . sure they have *Cymbidium* hybrids and some strange orchid types that only grow underground, but surely nothing of real interest to me!"

Fortunately that image is becoming less common among North American orchid growers, especially those who know their dendrobiums. As one of those who presumes to know something about them (foolish person that I am . . . imaginging that anyone can know very much about such an immense genus), I was asked to comment on the types of Australian dendrobiums grown here in the United States and to detail some of our growing methods. I suspect that such information will largely prove to be of academic interest for those of you who have observed them in the wild and adopted methods to simulate their habitat needs, but perhaps a few new ideas will emerge to help you.

I speak widely on *Dendrobium* culture here in the States and the questions I receive fall mainly into a few categories: what are the best growing media; selection of pot size and type (or should they use slabs); whether to give the plants a seasonal rest or not; and how to stimualte blooming among the more reluctant plants.

Determining the most desirable medium for *Dendrobium* plants is frequently a problem, but several types work well here. I know a grower who tries many novel culture techniques and he once grew a variety of orchids (including dendrobiums) on the outer convex surfaces of chromium plated automobile hub caps. The intent was not to define a new wonder medium . . . but to see just how adaptable orchids might be. They all grew and bloomed well . . . the point being that a good grower can make his or her plants perform properly using nearly any medium . . . but, of course, there are some media that offer fewer challenges.

One of the keys to proper media selection is water quality and frequency of watering. If the water is generally good (low dissolved salt content, nearly neutral pH, etc.), then the choices are wide, but most of us do not have such a luxury. My water here in north central Texas has a pH of 8.7–8.9 and is nearly saturated with calcium and sodium bicarbonates. I am forced to allow the water to stand open to the atmosphere to allow the bicarbonates to break down and to adjust my pH with acids (I use phosphoric acid as a buffer in combination with a low phosphorus soluble fertilizer). I have recently changed over to a reverse osmosis water system, justifying the added expense with better plant growth.

Given bad water, however, you will be forced into one or both of two modes: using a medium that retains little water and therefore does not concentrate salts, or a watering schedule that involves much flushing of the medium. I have chosen the latter with good success.

The media I found most useful in my bad water days include slabs, shredded tree fern and fir bark, though we all know the quality of fir bark these days! Most of my plants are now in either a coarse or fine mix made up of equal parts of charcoal and perlite, with 10% by volume of seedling fir bark and coarsely ground sphagnum. This mix stays properly moist and drains well. The bark/sphagnum addition helps roots get established and then rots away. This mix stays in good condition for years.

New Zealand sphagnum works very well when *Dendrobium* seedlings are small, or with plants that never require pots beyond the 4" (10 cm) diameter size . . . but seems to be deleterious for plants in larger pot sizes. I have grown numerous Australasian dendrobiums on slabs and feel that this is the best solution to watering problems . . . but some of the species and hybrids are a bit large. I grew *Dendrobium lineale* on a slab for many years, until the plant got over seven feet tall with dozens of canes. It grew well, but was impossible to move or show, so was eventually broken up.

Let's take a systematic approach and briefly review the North American cultural requirements of dendrobiums in these sections: the tall cane types in *Phalaenanthe* and *Spatulata; D. canaliculatum* and its hybrids; *Latouria; Pedilonum; Dendrocoryne;* and a few odd balls to take up the rear.

The cane types are by far the most widely grown dendrobiums in North America and give little trouble. They seem very tolerant of media, growing equally well in any well-drained mix. The only useful general rules are potting in a shallow container (the so-called Azalea pots, where a 6" [15 cm] wide pot would be 4"–5" [10–13 cm] tall), underpotting so that the plant has room for only 2–3 years of growth (potting too liberally seems to promote root rot) and growing them in generally the same conditions for cattleyas.

By the latter statement I mean bright light (4–8000 foot candles at midday), watering and feeding constantly all year long without a rest and never letting the temperature fall below 50°F (10°C). If chilled below 50°F for even a few hours these plants will be defoliated. Though often nearly ever-blooming in the tropics, most North American growers see flowers only once or twice a year, because we lose too much light during the winter months.

Bud drop and blasting is a problem if the humidity falls too low, but is prevented if the humidity remains above 50%. The only important insect problems we suffer are mealy bugs in the leaves near the cane tips and spider mites which attack the developing buds.

The other most important *Spatulata* member is *Dendrobium canaliculatum.* This species and its popular hybrids respond to bright to very bright light (nearly full sun in many locations), abundant water throughout the growing season and are tolerant of most media. I and other growers manage these plants well on slabs, but pot culture is successful if the plants are nearly pot-bound. Media of choice in pots includes New Zealand sphagnum when the plants are small, thereafter any well-drained mix will do.

Latouria dendrobiums are becoming more and more popular, but are still rather uncommon. Comments here are based on much less experience, but the plants grow well when treated as cattleyas . . . bright light, underpotting, feeding and watering evenly throughout the year and use any good open potting mix. The main problem I have seen in our areas is that people think that because latourias enjoy general *Cattleya* conditions, they also ought to be grown warm. Most *Latouria* species seem to like a cooler location in the greenhouse, or at least one with a good bit of air movement. One mystery to most of us is how to get the blasted things to bloom reliably. The better of them are awkward at best, and *Dendrobium spectabile,* for example, needs to get quite large and very root bound before it starts to bloom well and regularly.

The pedilonums are a favourite of mine and do well if given simple care . . . bright light, good air movement, abundant water throughout the growing season and depending on the species, a late winter rest. Some ever-growing and -blooming forms like *Dendrobium secundum* are given very bright light just beneath the glass on the south side [northern hermisphere] of the greenhouse . . . where they bloom throughout the year. Popular types like *Dendrobium smillieae* respond well to slightly more shaded conditions . . . but seem to bloom better if they are dried back a bit in the spring to cause some leaf drop.

Most of the group seem to like deeper shade and respond well to *Phalaenopsis* light levels. Among these are *Dendrobium mimiense, D. glomeratum, D. bracteosum* and *D. capituliflorum.* These compact smaller growing forms prefer to be grown in shallow pots or pans, or will respond well to slab culture.

With the exception of *Dendrobium kingianum* and its hybrids (plus *Dendrobium speciosum*), the section *Dendrocoryne* is little known or grown in our country. The general feeling among our growers is that the former are too cool growing and the latter either too much trouble to flower or too large and gross in habit. None of these negative comments are true . . . and surprises wait for the grower with imagination.

I grow these dendrobiums well in what many would consider a less than ideal climate. To give you a little feel for my growing extremes here in north-central Texas, my greenhouse temperature rises above 100°F (±38°C) EVERY DAY during mid-summer and almost always rises above 85°F (30°C) at some point every day of the year . . . hardly a cool house! Even as I write these words (July 1), the temperature in my greenhouse is 104°F (40°C) and there is a massively overgrown specimen of *Dendrobium kingianum* v. *alba* in bloom. I simply grow *Dendrobium kingianum* and its hybrids in bright *Phalaenopsis* light, give them good air movement and dry them off in late winter to early spring. No magic . . . no secrets . . . and they bloom!

The least known "secret" concerning this group (as far as growers in North America are concerned), is the fact that is is possible to "store up" flower buds for several years. This may or may not be a well-known trick in Australia, but we simply grow *Dendrobium kingianum* and *D. speciosum* (plus the allied species like *D. gracilicaule* and *D. X delicatum*) as cattleyas . . . bright light, lots of water and fertilizer . . . and NO WINTER-SPRING REST!

When grown like this for several years (2–5 in my experience), the plants will either fail to flower or will flower poorly during their normal blooming period. When finally given a proper late winter to early spring rest with reduced water, food and light, many of the dormant unused buds on growths made up during the growing phase will mature . . . and bloom together, making impressive show plants. *Dendrobium speciosum* is especially susceptible to such treatment.

The other really important *Dendrocoryne* species grown here are *Dendrobium tetragonum* and its allies. Those wonderful hybrids being made in Australia and New Zealand with *Dendrobium tetragonum* and its allies are almost unknown in North America to date, but when seen are instantly admired. Foliage on these plants will burn easily if grown like the other *Dendrocoryne* species, but respond well when grown under reduced light (low end of *Paphiopedilum* or *Phalaenopsis* conditions), given abundant water and grown through the year with little or no rest.

I grow *Dendrobium kingianum, D. speciosum* and their allies in the charcoal mix cited above. *Dendrobium tetragonum* hybrids do well in this mix, too, but perform equally well on slabs when misted frequently.

I promised to end with a few "odd fellows". Everyone will have a favourite or two for inclusion here, but in North America such a listing must include *Dendrobium cucumerinum, D. linguiforme, D. toressae,* the *D. teretifolium/ D. pugioniforme* types and *D. luteocilium.*

Dendrobium linguiforme is common, but the others are rare and much sought after . . . and then seldom grown well and too frequently lost. The clue to success seems to involve careful adherence to native conditions. I have grown a number of *Dendrobium cucumerinum* plants over the years . . . and lost too many of them. The success stories involved mounting the plants on rough-textured slabs of oak bark, watering them well through the year and growing them in bright shade . . . much lower than those suitable for cattleyas. *Dendrobium toressae* needs much the same conditions, with frequent misting.

Dendrobium linguiforme, on the other hand, takes any sort of light you wish to offer. Massive specimen plants are often seen at shows . . . and while one grower swears that the plant needs dense shade . . . the next tells me that he grew it in full bright sunlight, one will dry the plants off all winter, the other never reduces water.

The terete foliaged forms like *Dendrobium teretifolium* and its allies seem best when mounted on slabs of oak bark or natural cork. When so mounted and placed in bright, filtered shade they grow vigorously and flower abundantly . . . though even at their best they do look a bit straggly and odd to most folks.

Lastly . . . my own favorite odd-ball is *Dendrobium luteocilium.* It is an easy grower when placed in small pots, watered well all year and placed in bright shade to *Cattleya* conditions. The charm is two-fold to me . . . the curious delightful flowers face each other along the stems and flowers are surprisingly very short-lived under our conditions. We received an American Orchid Society award on our plant a few years ago when I took it to the Judging Centre in glorious full bloom . . . along the mid-portions of the canes. By the time the Judges saw it, those first flowers were past their prime, but a new set had opened. Those secondary flowers were awarded, but by the time the photographer took the record photographs he saw yet a third group of blossoms.

To sum up, I have probably told you little you did not already know about your dendrobiums, but there are some significant differences in culture between you in Australia and us here in North America. In preparing this article, I reviewed habitat comments in Dockrill (1969), Upton (1989), Lavarack and Gray (1985), Harrison (1982, 1983) and Rentoul (1982). In general we in North America seem to be growing our plants in brighter light settings, giving less attention to winter rests, paying little attention to temperature extremes and having great success with a variety of potting media. This suggests the happy conclusion that these delightful species and hybrids are tough and vigourous enough to put up with the abuse we put them through . . . and are able to grow and flower well in spite of us.

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PESTS AND DISEASES THAT CAN ATTACK NATIVE ORCHIDS

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When I first started growing orchids I thought that the best way to go would be to grow natives. At that time I was away most weekends bush walking in our beautiful forests. Observing our natives growing so easily with no diseases attacking the plants and apparently no insects around to cause any problems.

Once growing these wonderful plants I was in for a shock! How do plants survive so well in their native habitat and once in cultivation problems start, why? We now know that in nature there are many beneficial insects that keep nature in a healthy balance. In a mono-cultural situation this does not happen. Things get out of balance, pests come in, we spray, beneficial insects go as well as the pests. The same thing happens with diseases. All fungi live in peace until the balance gets out of whack. Then the strongest takes over, the plant is invaded, then the plant gets sick and eventually the plant dies.

There are many insects that attack our native orchids. some of these cause considerable damage while others are only nuisance value. In a mono-cultural situation sooner or later a pest will appear. Usually the pest is brought into your growing area as a hitch hiker on your plant. This usually appears after you have had your plant in a show, or a plant purchased or given to you. Pests often come in on the wind especially during August when the westerlies blow in hard and strong.

It is good practice to quarantine all plants that come back into you collection. You can give your plants a good spray or dust with a DIAZINON spray. Some growers dunk their plants in a DIAZINON solution before placing their newly acquired plant in with their treasured plants. DIAZINON is a relatively safe spray to use and should clean up all pests that could be present on the plant or in the growing media.

Pests that attack orchids are either chewing or sucking types. Chewing types are usually easier to control than sucking types.

All good orchid growers should inspect their plants on a regular basis. By doing this you will not let a pest get out of control. It is easier to control a small outbreak than a large invasion! If you find a small outbreak you can possibly use NATRASOAP. If the pest gets out of control you will have to resort to one of the more toxic types such as SUPRACIDE.

CHEWING INSECTS:

Most chewing insects are caterpillars which belong to the insect order *Lepidoptera.* Even though butterflies are very beautiful flying around your greenhouse, their eggs hatch into eating machines that can cause havoc to your plants and flowers. They just eat and eat until they reach their pupal stage.

If you are a devotee of biological control the B.T.'s are the way to go. The most popular of these is DIPEL. Remember the grubs must ingest the bacterium called *Bacillus thuringiensis.* DIPEL is not a contact killer. After ingesting the bacterium the caterpillars stop eating and are usually dead within four or five days.

Large outbreaks are usually controlled by using one of the CARBARYL-based sprays such as BUGMASTER. Grasshoppers are also very good at chewing into orchid plants expecially new leaves, flowers, buds and the raceme. In fact they can chew through a tough cymbidium raceme overnight!

To control this pest, a personal search is usually the best way to go. If a spray has to be used, use a CARBARYL or DIAZINON-based compound.

SUCKING INSECTS:

These come in many shapes and sizes! The main ones that cause problems to us as orchid growers are aphids, thrip, scale and mealy bugs. Of these, the scale insects can cause the most problems to the native grower. These insects are grouped together as the *Coccoidea* family.

There are many scale insects around that prey on our natives. The most serious of these is without doubt the BOISDUVAL SCALE *(Diaspis boisduvalii).* It gets down into the leaf axis and also down around the pseudobulbs of the dendrobiums where it is usually very hard to detect. It can also hide under the leaves of most genera. Brown soft scale and the Red orchid scale are also a problem. Those growers that grow sarcs know all about these soft scales!

The old method was to attack the scale with a cotton bud dipped in metho. This works if you only have a few plants. The light oils are also effective if used in late spring. Some of the other sprays that can be used with success are MALATHION, DIAZINON or

DIMETHOATE. If none of these give you the control you want you will have to resort to SUPRACIDE.

Mealy bug — *Pseudococcus microcirculus* (what a name!) can be a serious problem to native growers. It congregates around the bulbs, racemes and also on and in the flowers. Like scale insects, which they are related to, they are extremely hard to control. The metho treatment can be used on a small outbreak or you may have to try something a little stronger. Some orchid growers have used LEBAYCID with very good results, LEBAYCID can be phytotoxic to small plants and flowers. Before using this preparation check label to see if it is registered for use in your State. If you can purchase one of the wettable powder formulations of DIAZINON, this could be the way to go as the W.P. formulation does not effect flowers or buds.

REMEMBER when trying to control scale insects a good wetting agent is essential such as CODACIDE or PLUS 50.

The insect order called *Thysanoptera* or commonly called Thrip can be a problem in the spring. They settle on the flowers and pierce the surface of the blooms and leave little spots on the flowers where they have been feeding. FOLIMAT in the aerosol can has been used with success. To control them is a problem as they come in on the wind each day, so to control them is next to impossible.

Mites are not true insects, but for such a small so called non-insect they cause a lot of trouble. They get under the leaves of most genera and rasp away at all of the under side of the leaves. Certain clones of *Dendrobium kingianum* are very prone to attack as well as many of our terrestials.

They usually start attacking the plants during the early part of spring, climaxing in December and February then slowly decreasing in numbers till late autumn.

To control them you will use one of the recognised mitecides such as KELTHANE, TORQUE or OMITE. ROGOR, FOLIMAT and MAVRIK have been used with success. Remember most of these preparations can cause bud and flower burn.

Aphids are usually with us most of the year. Whenever we have a few flower buds and a few nice sunny days, aphids are around. One thing though, they are easy to control. Some growers hose them off their buds, but then they dry off and return to their favourite resting spot — your flowers! PIRIMOR is the recognised control spray. Remember it will only control aphids — no other pests. MAVRIK, FOLIMAT and ROGOR can also be used effectively.

BUGS and BEETLES:

Most bugs and beetles belong to the order *Coleoptera.* The most famous beetle that attacks natives is undoubtably the DENDROBE BEETLE.

It is about 5mm long, orange with a few black spots on its body. The adult beetle has a ravishing appetite and eats all genera — leaves, flowers and bulbs. Once it only attacked DENDROBIUMS but has now extended its horizons.

It can demolish a flower overnight. The larval stage can also cause havoc by eating flowers and also burrowing down inside the pseudobulbs of dendrobiums.

If you see them on a plant, they are easily caught by placing one hand below the beetle and with the other attempt to catch him. He will immediately drop into your hand for you to squash. Chemical control is not easy. The adult is controlled reasonably well with BUGMASTER while in the larval stage a good systemic is needed such as NUVACRON or ROGOR.

Cockroches belong to the order *Orthoptera.* They can cause havoc to your new roots. They come out of hiding at night and feed on the new tips. There are many preparations around that can be used such as FICAM and LORSBAN. Some growers who grow their natives in a glasshouse use cockroach bombs with good results.

Slugs and snails are usually controlled by using BAYSOL and DEFENDER snail pellets. MESUROL slug and snail spray is also very effective. In fact after spraying for snails you will find a few dead dendrobium beetles around! DEAD LINE is also very effective.

There are a very few diseases that attack our natives as long as you obey the rules such as a good free draining media and good air circulation.

The most common disease in natives (all genera) are the leaf spots. There are many spots and they all need different control measures. Most are controlled by one of the following: MANCOZEB, ZINEB, LANTOX or one of the trifoline preparations such as KENYONS black spot in rose control. Another trade name is SAPROL.

Leaf tip die back can be caused by bad fertilising practices or by a fungus disease called *Cercospora.* This is easily controlled by using BENLATE or SPIN.

If you get a lot of small spots underneath the leaves it is possible they are being attacked by one of the rusts. There are many preparations that can control them such as PLANTVAX, BAYCOR, SAPROL and MANCOZEB.

There are many other leaf spots that can also cause problems to the native orchid grower. Sunken watery spots can be a serious problem in hot humid weather. These watery spots can be caused by the pathogen *Pseudomonas* spp. Some growers place neat BENLATE powder on the blister with good results. GUARDEX has also been used and the old favourite WESCODYNE.

Bulb and root rots can be a problem in the spring and autumn. *Glomerella* spp. starts on the leaves and spreads down into the bulbs and then you do have a problem. BRAVO, ALIETTE and FOLI–R–FOS have been used with success. *Pythium* spp. a root rot and *Phytophthora* spp. a bulb rot can cause havoc to many natives. FONGARID works very well if used when the disease is first noticed. (Usually spring and autumn). It works better as a drench, rather than a spray. PREVICUR also works very well. Now that ROT GARD is on the market it will be interesting to see how well it works.

Erwinia spp. can cause a few problems in wet, cool conditions. It is a bacterial condition and is very hard to control. Bulbs go soft and young leaves fall off. Some of the ammonium chloride compounds have been used with great success (e.g. GUARDEX, ALGINOX).

Flower spotting caused by *Botrytis* spp. is easily controlled by plenty of air circulation. In cool, damp situations you may have to resort to chemical control. BENLATE misted over the flowers will control the problem.

Remember before using any agricultural chemical check the label to see if it is legal to use that product on your plants in the State that you live in. All States have different regulations.

Once you have read the label and find that you can legally use it, make sure you are adequately protected by protective clothing, e.g. respirator, goggles, hat, gloves, rubber boots, apron and spray suit.

After spraying, shower well and wash all clothes separately, not in with the family wash.

REMEMBER all agricultural chemicals are dangerous so please be careful. Follow directions on containers regarding rate and application.

Some common trade names of chemicals that are mentioned in this article:

Trade Name	**Common Name**
ROGOR	dimethoate
SAPROL	triforine
BAYCOR	bitertanol
PLANTVAX	oxycarboxin
GESAPON	diazinon
MALATHION	maldison
BENLATE	benomyl
SPIN	carbendazim
NUVACRON	monocrotophos
WESCODYNE	iodophor
FONGARID	furalaxyl
BRAVO	chlorothalonil
ALIETTE	fosetyl
FOLI–R–FOS	phosphorous acid
BAYSOL	methiocarb
MESUROL	methiocarb
MANCOZEB	dithane
THIRAM – LANTOX	thiram
ZINEB	zineb
LORSBAN	chlorpyrifos
FICAM	bendiocarb
FOLIMAT	omethoate
MAVRIK	fluvalinate
OMITE	propargite
KELTHANE	dicofol
TORQUE	fenbutatin
SUPRACIDE	methidathion
BUGMASTER	carbaryl
DIPEL	bacillus thuringiensis
LEBAYCID	fenthion
PIRIMOR	pirimicarb

For further information on products mentioned in this article contact Alan Merriman MIRIAM ANN ORCHIDS, telephone (047) 39-5141.

LETTER TO THE EDITOR

Editor,

This is a plea for you to promote the appreciation of Australasian orchids. In particular, knowledge of Australasian native orchid hybrid registrations.

So many people have a narrow minded data base that is based on nationalism rather than geography of the continent and its associated botany.

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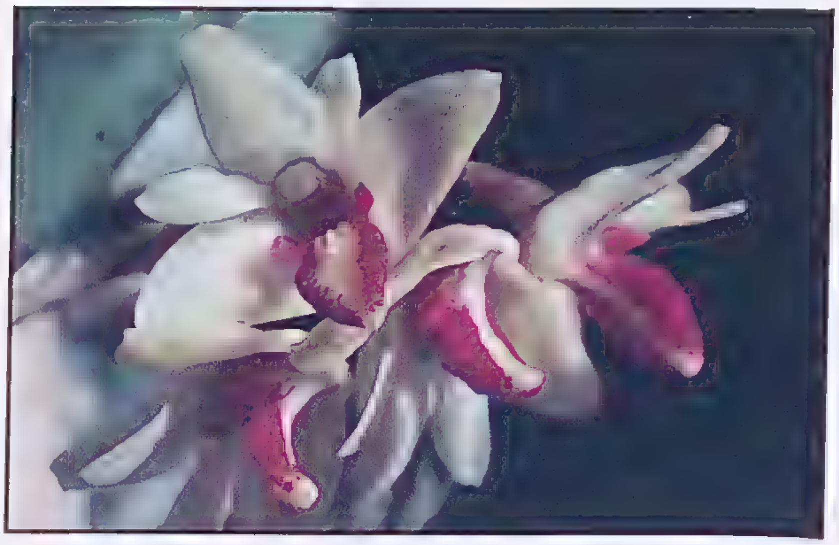

Plate 1: *Dendrobium rigidum* from the Daintree River. This is a fairly common colour form, with solid red markings down each side of the labellum.

Photo: M. Harrison

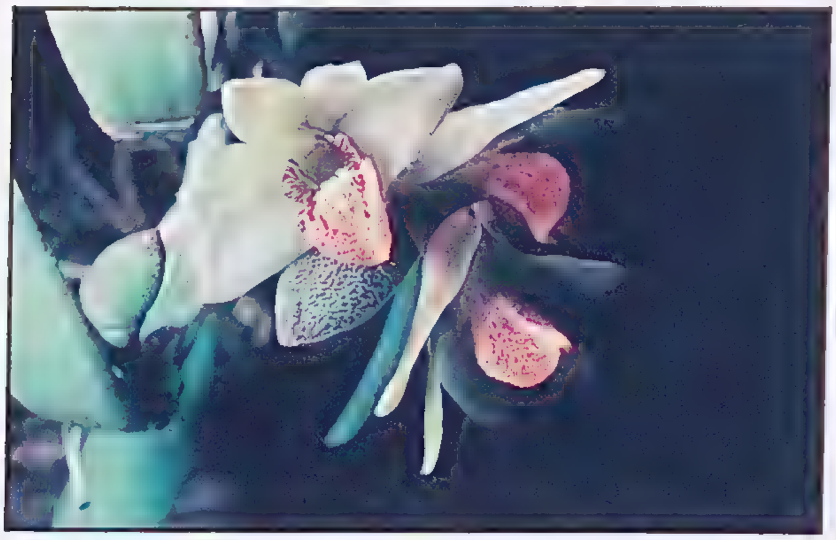

Plate 2: A typical form of *D. rigidum* from the McIlwraith Range.

Photo: D. Titmuss

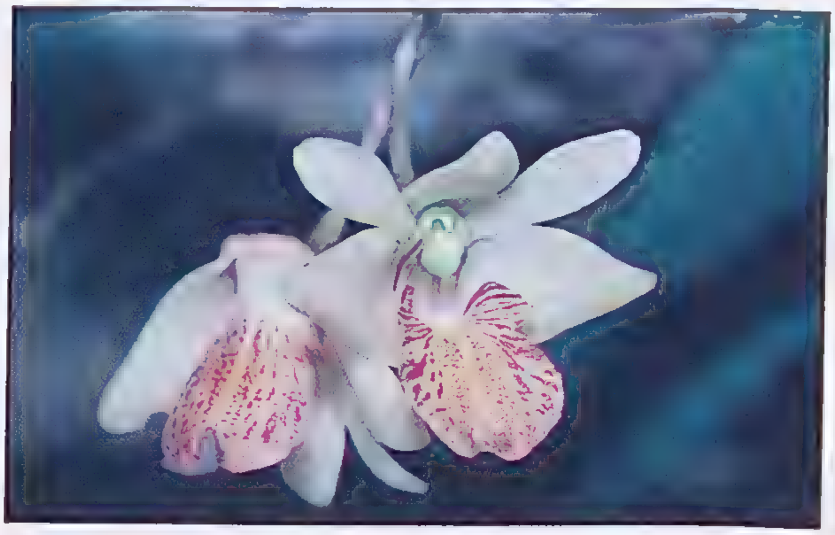

Plate 3: A large flowered form of *D. rigidum* from the very top of Cape York Peninsula. Note the wide, protruding labellum.

Photo: M. Webb

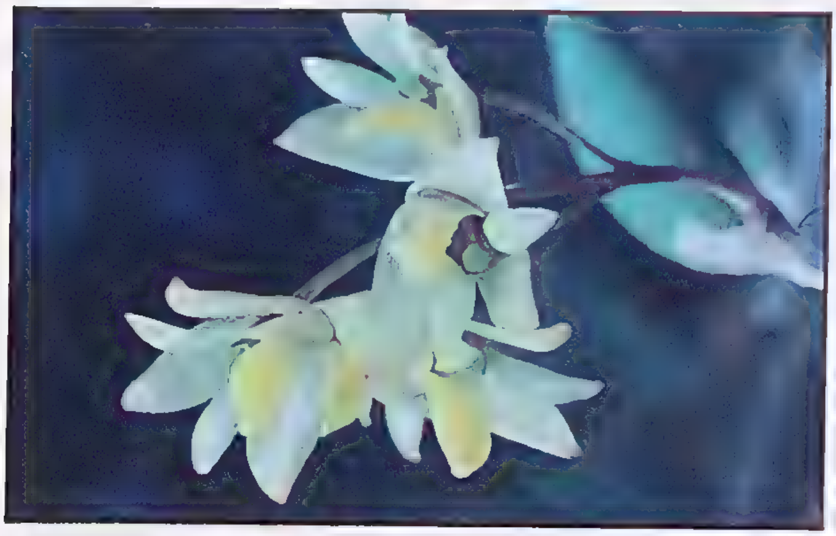

Plate 4: *D. rigidum* 'Anton's Yellow', a very attractive colour form with an unmarked, pure yellow lip, was originally collected from near Cooktown.

Photo: M. Harrison

DENDROBIUM RIGIDUM R.Br.

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Surely one of the most remarkable things about orchids is the seemingly endless variation in their vegetative forms. To appreciate the extent of this diversity, one has to look no further than the genus *Dendrobium,* which boasts an enormous and at times bewildering, range of variety in dimension, colour, shape, contour, proportion and habit.

To my mind, *Dendrobium gracilicaule* represents the classic dendrobium orchid shape, with its slender, pseudobulbous stems, up to 60 cm tall and glossy green apical leaves. Its clean lines and lovely proportions often go unappreciated, probably because familiarity has bred a degree of contempt, but to see a plant perched gracefully in the centre of a moss-covered rainforest limb is to be confronted with a statement in simple elegance.

At the other end of the spectrum we have the so-called "fleshy-leafed" dendrobiums. Graceful and elegant are surely not suitable adjectives to describe the various vegetative forms of these species and yet they have a distinctive charm that cannot be denied. They are attractive and appealing because of, rather than in spite of, their unusual appearances. *Dendrobium* Sect. *Rhizobium* in Australia contains between 13 and 18 or 19 species (depending upon classification) and with common names like cucumber orchid *(D. cucumerinum),* rat's tail orchid *(D. teretifolium),* thumb nail orchid *(D. linguiforme)* and dagger orchid *(D. pugioniforme)* describing their various leaf shapes, it is not difficult to appreciate that these species make up a very distinctive and unique section within the genus in this country.

One of my favourites in this group is *Dendrobium rigidum.* It has colourful flowers, it is quite variable in its plant form and importantly, it is an easy species to grow in cultivation. In fact, in its variability it reminds me a bit of *D. kingianum,* in that no two plants are ever exactly alike.

Named by Robert Brown in 1810, *Dendrobium rigidum* was originally discovered near the Endeavour River on Cape York in 1770 by Carl Solander, one of the naturalists who accompanied Joseph Banks on Cook's expedition to find the "great south land". When Captain Cook and his crew were forced to careen H.M.S. *Endeavour* for six weeks to repair extensive damage to its hull caused by a collision with a coral reef, Banks and Solander took the opportunity to explore the region. Solander found and drew *D. rigidum* during this time and his original sketch is in the British Museum. Its specific name refers to the stiff and rigid nature of the plant.

The succulent, single, fleshy leaves of *D. rigidum* range in shape from almost round, with a diameter of little more than 10 mm, through to long, slender, curved leaves up to 50 mm in length. Leaf colour also varies, from grey-green to mid-purple and although light intensity influences leaf colour to a certain extent, there is considerable variation independant of this factor. The leaf surfaces are covered with minute tubercles which can be felt by running your finger along the leaf.

The leaves are carried on thin wiry stems which radiate randomly from the centre of the plant. As with all members of *Dendrobium* Sect.*Rhizobium,* the new leaves are produced progressively from nodes on the sides of the stems. Directly behind each leaf there are several nodes from which are produced the flowers as well as new vegetative parts. At regular intervals new vegetative growth is initiated, which, when fully expanded and mature, consists of a fresh stem, up to 40 mm long and leaf. Usually, each section of stem produces only one new growth, but sometimes two may develop and the stem system divides and continues to grow in two directions. When new stems are initiated from the centre of the plant, they grow in a more or less erect manner, but as they elongate and are weighed down by more and more leaves, they become pendulous. A large plant of *D. rigidum* may have stems up to 40 cm long.

D. rigidum flowers intermittently throughout the year, but mostly during spring and autumn. Two to eight flowers are produced on each inflorescence and some clones produce clusters of flowers in very attractive rosette arrangements. Flower colour in *D. rigidum* is variable, although the tepals are generally cream to yellow, with or without a suffused overlay of fine pink or russet mottling on the reverse side. At times, this suffusion can be very attractive, giving the flowers a pink flush, whereas in other clones it simply muddies the colour.

However, it is on the labellum that the most striking colours and colour combinations are found. Most clones have some amount of red or orange on the labellum, the most common arrangement being a longitudinal strip of cream or yellow down the middle of the lip and varying amounts of red or orange down the sides. This red/orange may be spotted or blotched, or may be bands of solid colour. In some clones the red/orange markings are distributed over the entire lip. Occasionally, the lip is completely devoid of the red/orange markings and the flower is entirely cream or, rarely, sulphur yellow.

Labellum shape and size also vary in *D. rigidum.* Some clones have narrow, relatively short labella, whilst in others the labellum is wide and protruding, with the mid-lobe curved at 90° and presenting like an outstretched tongue.

D. rigidum is distributed along Queensland's east coast, northwards from about Innisfail to the tip of Cape York. It also occurs on the islands of Torres Strait and in New Guinea. It grows from sea level to at least 300 metres altitude on the ranges and extends from the coastal mangrove and paperbark swamps to the open savanna of the interior. In some places it grows on the fringes of rainforest, where it enjoys relatively lush and sheltered conditions. Elsewhere, it inhabits the seasonally arid deciduous vine forests, in association with the likes of *D. bigibbum, D. discolor, Oberonia complanata* and *Luisia teretifolia.* Generally though, *D. rigidum* is a species that prefers some protection and it is commonly encountered growing on trees in or near swamps and along watercourses. However, it mostly shuns rainforest proper, preferring the more airier, brighter conditions afforded by open forest types. Although it is quite capable of withstanding long periods of dry weather, *D. rigidum* reaches its best development in areas that receive at least some rainfall during the dry season, which usually extends from the end of May until November or December.

D. rigidum is colony forming on a number of host tree species, ranging from mangroves to paperbarks, but usually those with rough or flaky bark. Occasionally it may be seen growing on rocks. In many areas *D. rigidum* is a very common orchid.

Although its cosmopolitan requirements bring it into association with a large number of other orchid species, only one natural hybrid has been recorded. *D. rigidum* X *D. teretifolium* var. *fasciculatum,* known as *D. X foederatum,* has been recorded on only a couple of occasions from a single location. This natural hybrid apparently grew in a mangrove swamp adjacent to Cairns airport which was unfortunately destroyed during expansion of the airport some years ago. Divisions of these plants have survived in cultivation.

D. rigidum grows well in cultivation as long as its requirement for a little warmth in winter can be met. It can be successfully cultivated with minimums as low as about 8°C, but trouble can be experienced if temperatures fall much below this on any regular basis. For many parts of temperate Australia, a glasshouse will be required to grow this orchid during the winter, although during the warmer months *D. rigidum* will perform very well in an open shadehouse. Certain clones may be adapted to withstand colder winter-time minimums by slowly acclimatising them over a period of a couple of years, but these plants will still remain vulnerable to cold stress.

The usual mode of culture for *D. rigidum* is on a hanging slab of some suitable material such as cork, treefern fibre or hardwood. Being essentially a plant with a pendulous habit it lends itself well to slab culture and an attractive specimen can be produced in time. It is important to choose a material that is long-lasting, as the plant will do best if it can be left undisturbed for as long as possible. The other essential thing is to provide a slab that is large enough to support the plant's root system. *D. rigidum* is not nearly as robust a species as, say, *D. teretifolium,* or *D. bowmanii,* but it nevertheless requires a slab of reasonable proportions. I would recommend nothing smaller than 15cm x 10cm and a big plant may require something somewhat larger.

Apart from cork, treefern fibre and hardwood, other materials upon which I have successfully grown *D. rigidum* include chunks of coconut husk, ironbark totem and lengths of paperbark of approximately 5cm in diameter. *D. rigidum* performs equally well on all of these and seems to show no particular preference. Some of my plants, notably those on coconut husk and paperbark branches, have been growing undisturbed for upwards of fifteen years and are still in good health.

The other method of cultivation which I have seen employed, but only occasionally, is pot culture. The first plant of *D. rigidum* I ever saw, in 1968, was growing in a 100mm plastic pot in a typical pinebark based potting mix, suspended above the bench in a glasshouse. The pendulous stems hung down from one side of the pot and it looked an absolute picture in full bloom. I still remember it well.

The only plants of *D. rigidum* I have ever tried in pots myself are deflasked seedlings, which can be potted out into 50mm tubes very successfully. They usually grow strongly and quickly, although they are susceptible to excess moisture caused by overwatering or a seedling mix which is too moisture retentive. Recently deflasked seedlings usually thrive under shaded, humid and moist conditions and seedlings of *D. rigidum* are no different. However, the seedling mix must still be open enough to allow air movement through the mix so that the orchid roots can breathe. A seedling mix in which the components are too fine, especially if it contains too much pinebark dust, sand or other very fine material, will stay too wet and will impede good air exchange. As a consequence, the seedlings may suffer rotting or may fail to grow as strongly as they might. My own seedling mix is generally made up of 4 parts treated pinebark, 2 parts crushed quartz or quartz pebbles and 1 part charcoal, all approximately 5–6mm in diameter.

In recent times I have been deflasking some of my seedlings into sphagnum moss, in particular many of the so-called "botanical" species and just about anything else I think will need special care. I especially like the New Zealand pelletised type because it is easy to use and is easily wettable, however, seedlings of *D. rigidum* which I have tried in sphagnum moss have not done as well as those I potted into my normal seedling mix and I think this is due to the extra water held around the plants by the sphagnum. Typically, if the plants are kept too wet, the newly developing leaves simply become watery and rot and in a seedling this process is difficult to halt. Seedling plants of *D. rigidum* are best potted out into a normal seedling mix or else tied directly onto slabs.

With seedlings onto slabs, the best success I have had is with lengths of weathered hardwood palings cut to approximately 30cm long by 4cm wide. Onto the face of each paling I tie small wads of soft treefern fibre, about 4cm x 3cm and between 5mm and 10mm thick, so that there are 5 or 6 wads spaced evenly along each length of hardwood. Onto these wads of treefern fibre I tie the seedling plants of *D. rigidum*. The new roots quickly penetrate the soft treefern and run out onto the hardwood. When the plants are big enough they can be lifted off separately and replanted individually onto larger slabs without any trouble. The feature of this method is that the seedlings have the advantage of the moisture holding capacity of the treefern fibre, but as they grow and send their roots further, the roots outgrow the fibre and simply attach to the hardwood and the problems of overwatering are minimised.

Likewise, seedlings raised in 50mm tubes can be easily potted-on into larger pots as the occasion arises. Or, instead of potting-on, they can be removed from the tube and re-established on a slab at this point if so desired.

For peak performance, *D. rigidum* requires fairly strong levels of light. In nature, it generally grows in situations where it receives moderate to high light and such conditions should be replicated under cultivation. In my glasshouse, *D. rigidum* grows alongside *D. canaliculatum, D. trilamellatum, D. johannis* and the like. These plants grow under 50% shadecloth from the end of September through to the beginning of April, at which time the shadecloth is rolled back to allow full light penetration through unpainted glass during autumn and winter. In September the shadecloth is again positioned over the glasshouse. It sits on the hailguard, about 30cm above the glass.

D. rigidum enjoys plenty of water during the warmer months, but watering should be restricted from mid-autumn until the weather becomes warmer again in spring. It does not need to have a dry season rest as such, like many of the other tropical dendrobiums, but too much water during the winter months will lead to rotting of the newer "soft" leaves and may also cause die-back on the root system. At these times of the year the grower should aim to keep the plants a bit on the dry side, but not so dry that the leaves become shrivelled or desiccated. A lot depends on the individual glasshouse environment and of course, prevailing weather, but for *D. rigidum* growing on a slab, watering twice a week during winter should be adequate.

Come October/November, the situation changes. As days become longer and temperatures warmer, watering can be stepped up accordingly. Although daytime temperatures are already climbing into the 30°C's, the nights are still generally cool, so I restrict my watering to between 7.00 and 9.00 in the morning. By this time of the year I am watering daily in the glasshouse. As spring becomes summer, watering is increased further, both in quantity and frequency. Once night-time minimums are not falling below 20°C, I do my main watering in the evening, in order to allow the plants to stay damp overnight and absorb as much water as possible. I generally also water between 7.00 a.m. and 8.00 a.m. and again later in the morning if necessary.

As long as good air ciruclation is provided around the plant and through the glasshouse, *D. rigidum* can take just about as much water as the grower can throw at it during the summer months. What it will not tolerate, however, is a heavy, turgid and stagnant atmosphere, the kind of atmosphere to be found in a poorly ventilated glasshouse. The importance of good air circulation and adequate ventilation cannot be overstated and more plants succumb to problems associated with this aspect of glasshouse management than to anything else. Persistent fungus attacks are often a symptom rather than a problem in their own right and improved ventilation and internal air circulation will often be much more effective than continued spraying with expensive fungicides. This is not to say that there is not a place for preventative spraying if a problem exists, but the glasshouse environment must also be analysed and corrected where necessary.

A regular feeding programme will also benefit *D. rigidum,* although it is not as heavy a feeder as most of the tropical pseudobulbous dendrobiums. These species, because they do all their growing between October and April and then flower and rest (e.g. *D. bigibbum*) or rest and then flower (e.g. *D. canaliculatum, D. trilamellatum*), require plenty of feed, along with copious amounts of water, during the growing season. In a mixed collection, with different species growing side by side, it is difficult to significantly vary conditions from plant to individual plant. The grower tends to group plants according to cultural requirements and in that way creates and maintains different micro-environments within the orchid house.

In my glasshouse, *D. rigidum* receives more or less the same attentions and conditions as the other species in its "group" and when I am watering and/or feeding *D. trilamellatum, D. canaliculatum, D. johannis,* etc. *D. rigidum* gets the same treatment.

A few years ago I visited a remarkable area of gallery rainforest on the McIlwraith Range on Cape York Peninsula. In area, it was probably no larger than about five hectares, but it supported a wealth of orchids. The closed canopy of the gallery forest created a cool, humid and very sheltered environment and the orchids to be found there were those species which require such heavy protection. *Phalenopsis amabilis, Sarcochilus moorei, Trichoglottis australiensis* and *Robiquetia wassellii* were all present, mostly gowing on the main trunks of the trees and often within only a couple of metres of the forest floor. *Dendrobium tetragonum* var. *giganteum* was common, indicating its preference for very shady situations and the deciduous species *D. stuartii* was also seen. However, once the boundary between the gallery forest and the surrounding eucalypt forest was breached, conditions changed noticeably. The broken canopy allowed much higher penetration of light and as a consequence the air temperature was several degrees warmer. Also, the air smelled discernably drier. Over a distance of not more than 10 metres, the change was dramatic, from the subdued, cathedral-like atmosphere of the rainforest to the bright, open and breezy conditions beyond its borders.

D. rigidum was prolific on the trees in this narrow intermediate zone, where the rainforest graded into open forest. It particularly favoured the trunks and main laterals of a flaky-barked, medium sized tree which grew as an understory species, but it was not entirely restricted to this host. Also colonising on trees in this zone were considerable numbers of *D. johannis* and *D. wassellii.* I could only marvel at the range in the orchid flora of this very special place and it is to this place that my mind travels when I think of *D. rigidum.* I can still see it there, from small seedlings to large adult plants, a thriving colony of this lovely species, growing and flowering alongside its orchidaceous neighbours and in complete harmony with its tropical forest hideaway. It is a memory that will nourish me for many years to come.

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Dockrill, A. W. (1969). "Australian Indigenous Orchids", Vol. I, The Society for Growing Australian Plants, Sydney.

Upton, W. T. (1989). "Dendrobium Orchids of Australia", Houghton Mifflin Australia, Melbourne.

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Seasons Greetings

☆ and ☆

Best Wishes

for the New Year

★ ☆ ★

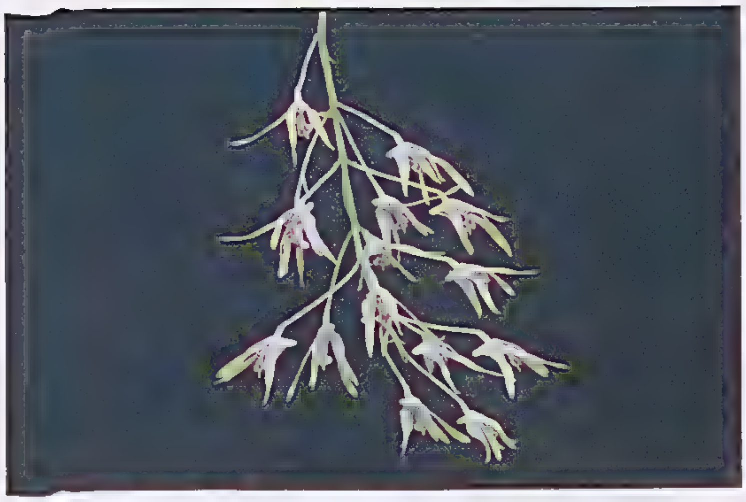

Plate 5: *Dendrobium canaliculatum* var. *foelschei.*
Photo: W. T. Upton

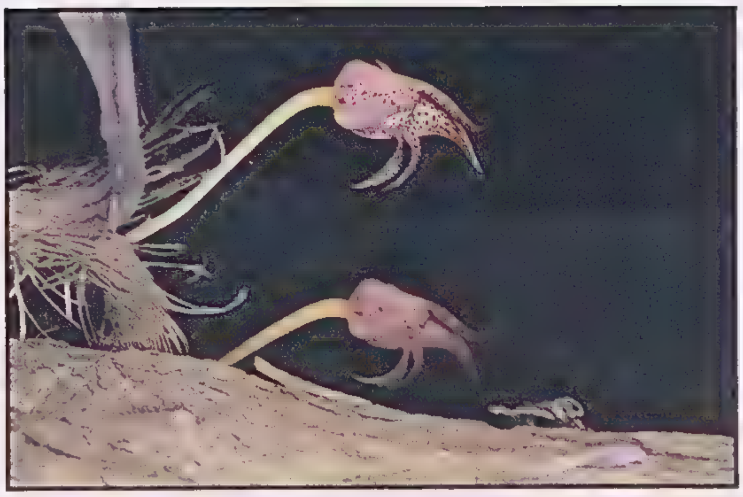

Plate 6: *Bulbophyllum emiliorum.* New Guinea.
Photo: W. Bandisch

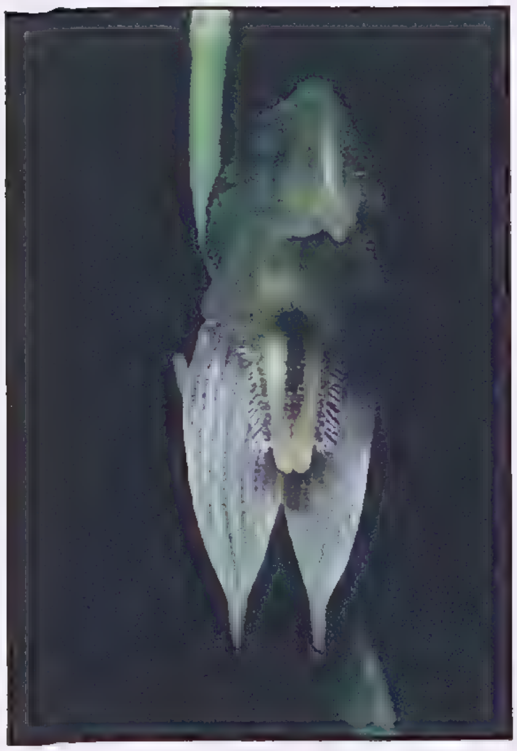

Plate 7:
Pterostylis longifolia.
Photo: L. Cady.

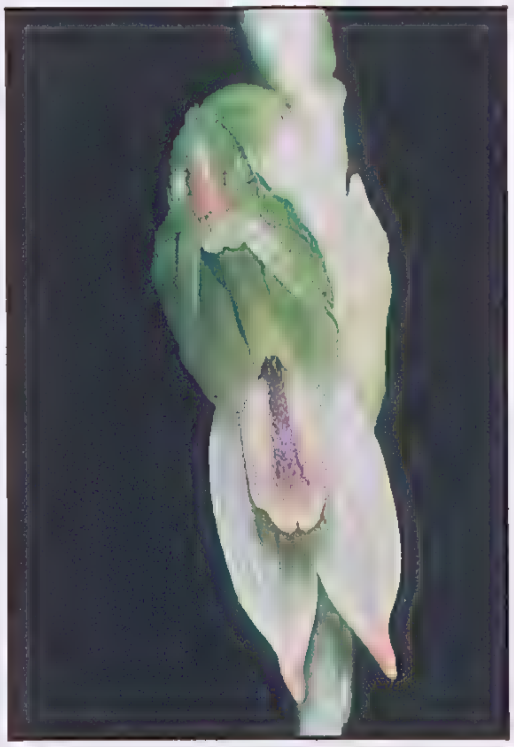

Plate 8:
Pterostylis tunstallii
Photo: L. Cady.

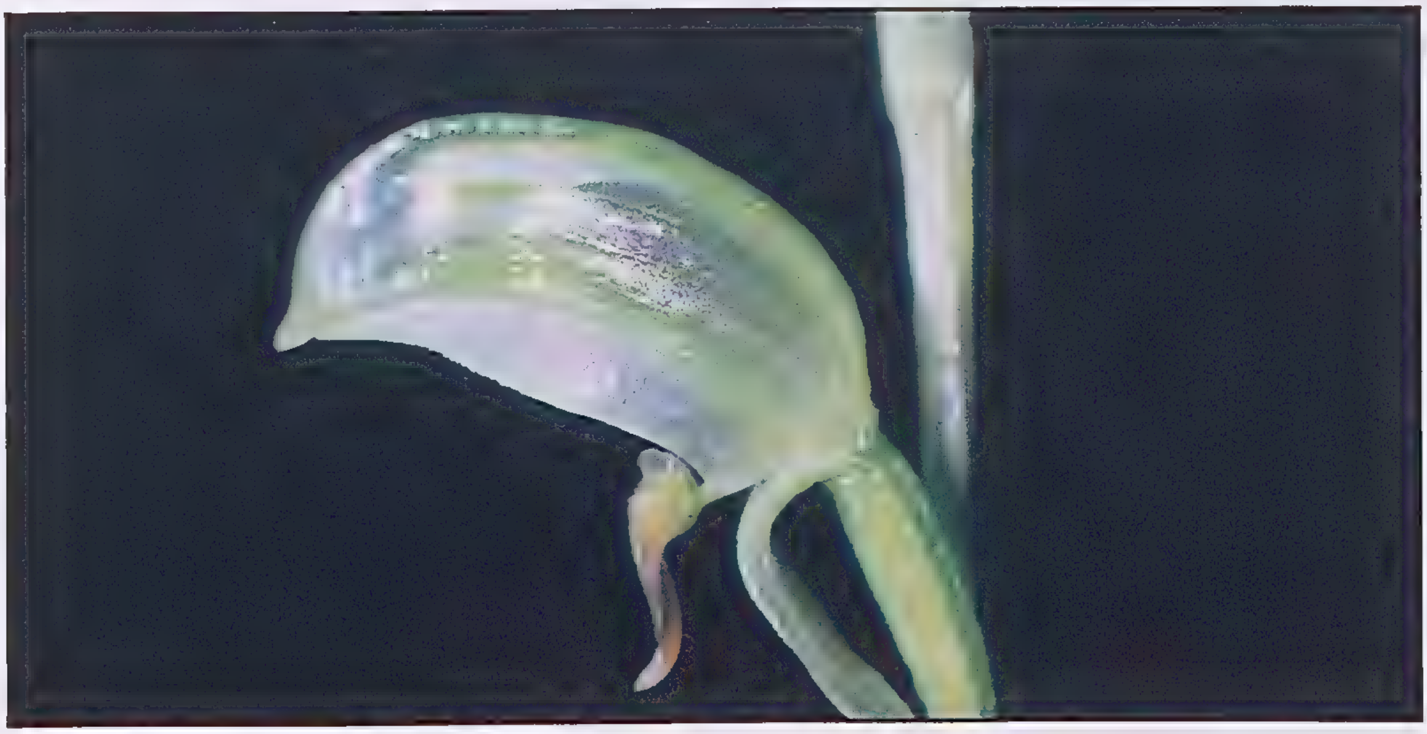

Plate 9: *Pterostylis tunstallii* Photo: L. Cady

DENDROBIUM FOELSCHEI F. MUELL. 1882

Gerald McCraith,
107 Roberts Street,
Essendon, Victoria 3040

For many years, this species was generally known as a variety of *Dendrobium canaliculatum,*(Plate 5) until Mark Clements elevated this species to agree with F. von Mueller's description of more than 100 years ago. Australian Orchid Research Vol. 1, 1989. [Ed. Note — Not all botanist or enthusiasts are prepared to accept this variety of *D. canaliculatum* as a species in its own right].

Its distribution probably extends from Groote Island in the Gulf to the east and to the Kimberleys in the west and centred in the Darwin region.

It is expected that more knowledge of this species will be known when Peter Jobson completes his studies on the *D. canaliculatum* complex. Peter is working from the James Cook University in Townsville.

But who was Foelsche!!!

On a recent trip to the Darwin region retracing some war-time footsteps, I visited the "Fannie Bay Goal" 1883–1983, which has been turned into an interesting museum that is well worth a visit when you are attending the 13th Australian Orchid Conference in July, 1994. In the old laundry, on show, is the life story of Foelsche.

Paul Himrich Matthias Foelsche . . . is regarded as the "father" of the N.T. Police. He was born at Moorburg, near Hamburg, Germany in 1831, he died at Palmerston on 31st January, 1914, after 44 years in the N.T.

At the age of 18, Foelsche enlisted in the German Regiment of Hussars; at 25, he migrated to South Australia and joined the Mounted Police as a trooper, 3rd class.

In 1867, he was serving as a Corporal at Strathaebyn, near Adelaide and in 1869, he was promoted to the rank of Sub-Inspector to take charge of a detachment of Mounted Police at Palmerston, later to become Darwin.

Soon after his arrival in the north, Foelsche took up photography and most of the early photographs of the Territory were taken by him.

An exhibition of his work was displayed in the Darwin Museum and Art Gallery at the city's centenary. His work was described as excellent, even judging by today's standards.

Foelsche was a Magistrate, a Coroner, an armourer, a rifle stock maker and had a good knowledge of dentistry.

He was also one of the first Trustees of the Methodist Church and was the Foundation Master of the Port Darwin Freemasons Lodge.

He also became known for his papers on Aboriginal languages, customs and rituals which he studied closely and with appreciation.

Early in his career in the Territory, Foelsche was decorated by the Kaiser and on his retirement from the Mounted Police in 1904, he was awarded the British Imperial Service Medal.

Foelsche has also been honoured by having a river, a mountain, a Darwin street, a species of eucalypt and an orchid species named after him.

Few pioneer officials in the N.T. have been accorded so many marks of respect by their peers and the people generally.

BULBOPHYLLUM EMILIORUM AMES AND QUISUMBING A NEW RECORD FOR NEW GUINEA

N. H. S. Howcroft,
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Specimens have been examined of a *Bulbophyllum* species previously considered to be a form of *B. macranthum* Lindl. (section *Stenochilus*) and published under that name (Millar, 1978). Unlike *B. macranthum* the flowers of this species do not open widely but are fastigiate for half to two thirds the length of the sepals and petals. The dorsal sepal and the petals are then recurved in the last one third towards their apices. This characteristic is consistent over the known range of the species in Papua New Guinea. Differences from *B. macranthum* are

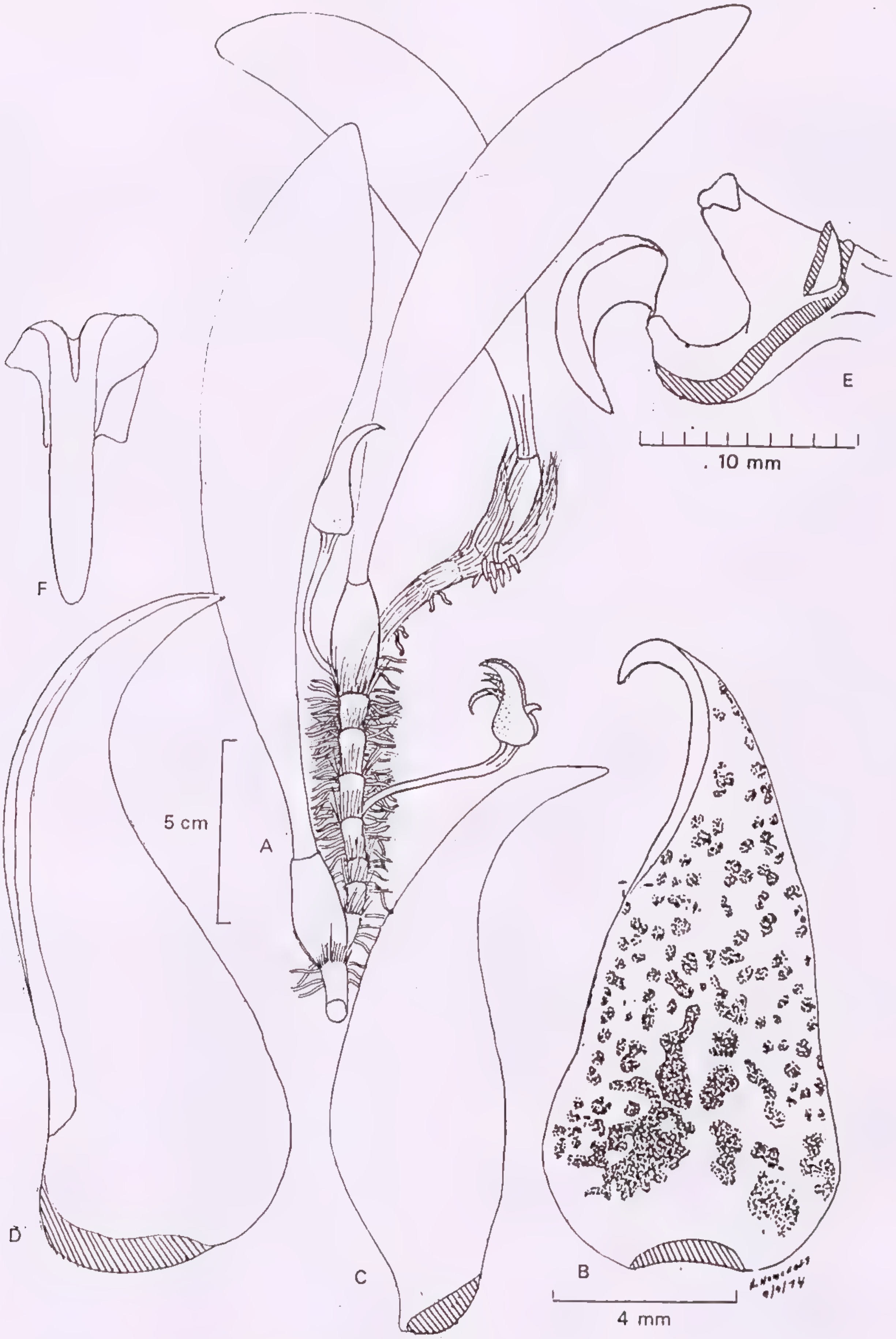

Fig. 1 ***Bulbophyllum emiliorum*** **Ames & Quisumbing**

A – Plant habit (to 5 cm scale);
B – Dorsal sepal (to 4 mm scale);
C – Petal (to 4 mm scale);
D – Lateral sepal (to 4 mm scale);
E – Side view of column and labellum (to 10 mm scale);
F – Front view of labellum (c. twice scale for E).

also evident in the shape of the sepals and the labellum.

The species characteristics are identical to those described for *B. emiliorum* Ames and Quisumb. from the Philippines region. They do not appear to fit the descriptions of any other species of this section described from New Guinea. An illustration of the New Guinea *B. emiliorum* is presented in this paper and the following description of this species is a slightly amplified version of that by Ames and Quisumbing (1931) and includes measurements taken of the New Guinea material.

DESCRIPTION

Bulbophyllum emiliorum Ames and Quisumbing in Philpp. Journ. Sc. 44: 337 (1931); type: Philippines, Mindanao, Agusan Province, Butuan, Barrio Guadalupe, **Emilio Quisumbing** s.n.

Plant epiphytic; **rhizomes** creeping, c. 5mm diameter; roots numerous; **pseudobulbs** 1.8–2cm tall, 1–1.3cm diameter, 8–10cm apart, unifoliate. **Leaf** elliptic — oblong, obtuse, 19–21cm long, 6–6.5cm wide (Fig. 1A). **Flowers** single, tepals fastigiate for c. two thirds length (Fig. 1A). **Dorsal sepal** oblong — lanceolate, apex acute and finely acuminate, c. 3.5cm long 1.2cm wide (Fig. 1B); **lateral sepals** sigmoid — lanceolate, finely acuminate, c. 3.2cm long, 1.3cm wide at base (Fig. 1D); **petals** narrow — lanceolate, acuminate, recurved at apex, c. 3cm long, 0.8cm wide (Fig. 1C); **labellum** articulate on a slender foot, c. 8mm long, 4mm wide between lateral lobes (Fig. 1E); **lateral lobes** short, rounded, spreading, obtuse, c. 2mm long; **midlobe** linear — lanceolate, acute, c. 5–8mm long, 1–2mm wide, recurved, fleshy, rigid (Figs. 1E and 1F). **Column** thickened, short, 4mm long, 4mm broad; **foot** c. 8–9mm long (Fig. 1E). **Pollinia** triangular.

DISTRIBUTION

Philippines to the Papua New Guinea where it has been collected from the Western, Central, Milne Bay and Oro provinces.

HABITAT

Coastal lowland forests to lower montane, from sea level to c. 700 metres altitude.

CULTIVATION

As with many of the other species in this section *B. emiliorum* can be grown on tree fern or hardwood slabs. Large specimens were cultivated on living Calliandra trees in my Bulolo garden (700 metres above sea level in a seasonal climate with a annual rainfall of 1600mm).

FLOWERS

The flowers (Plate 6) are a glossy white to cream on the exterior of the sepals while the face of these are cream to yellow with numerous red and maroon spots and blotches as illustrated in Figure 1B for the dorsal sepal. The lower margin of the lateral sepal is coloured a deep maroon and the petals are yellow with intense spotting. The labellum is a yellow green. The flowers are borne one per inflorescence sporadically throughout the year. They last for 2–3 days and produce a pleasant odour which attracts numerous fruit flies.

NOTES

According to Ames and Quisumbing (1931) this species is closely related to *B. coplandii.* In New Guinea its closest allies are *B. grandifolium, B. gjellerupii, B. macranthum, B. truncicola* and *B. werneri.* Of these the only species with a fastigiate sepals habit is *B. gjellerupii* all the others open fully.

CONSERVATION STATUS

Not known.

LITERATURE CITED

Millar, A. (1978) Orchids of Papua New Guinea. Australian University Press, Canberra.

Ames, L. O. and Quisumbing, E. (1931) New or noteworthy Philippine orchids, 1. The Philippines Journal of Science.

ACKNOWLEDGEMENT

Comments and advice on the contents and presentation of this paper were provided by Professor G. Stocker, Forestry Department, university of Technology and his assistance is gratefully acknowledged.

PTEROSTYLIS TUNSTALLII D. JONES et M. CLEMENTS

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Kiama, N.S.W. 2533

I noticed whilst going through some of my collecting day books, a note on the "different forms" of *Pterostylis longifolia* R.Br., collected in the Jervis Bay area on the 13th June, 1959. At the time two distinct labella forms were drawn and it was noted that most other features were similar. In 1989 (1) D. Jones and M. Clements described in Latin *P. tunstallii.*

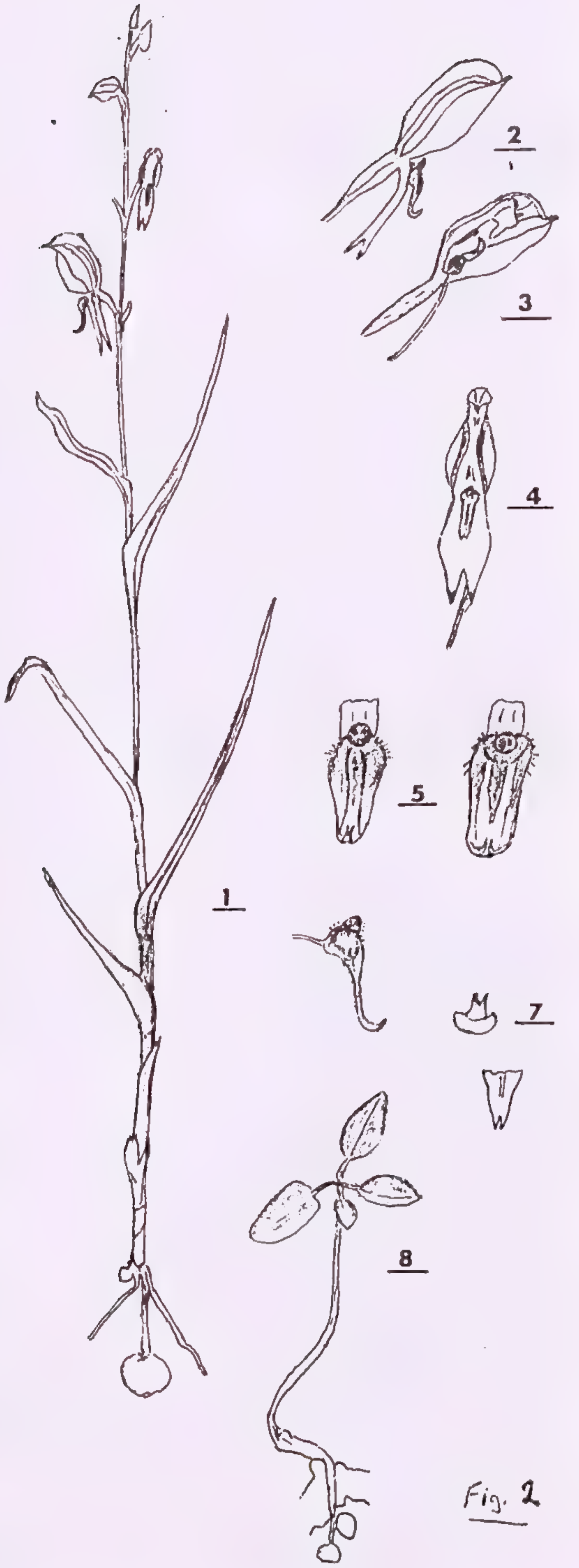


Fig. 2

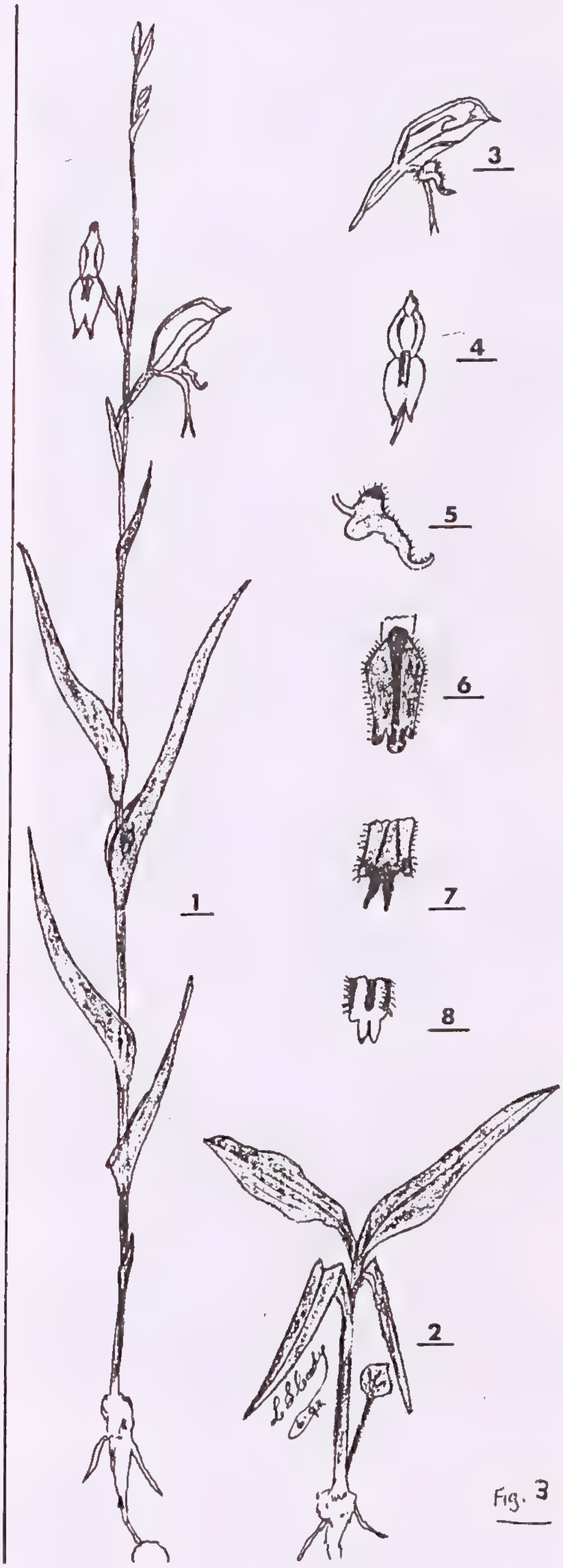


Fig. 3

A few days ago my friend Ron Tunstall arrived with a few plants of the species named after him, from the type site.

In my examination of these plants it was obvious that the drawings I had carried out so long ago and the plants being examined were the same species. To my knowledge this species has not been illustrated or described in English. Below is a description of *P. tunstallii* together with comparison drawings of both *P. longifolia* and *P. tunstallii.*

Pterostylis tunstallii D. Jones et M. Clements (Fig. 2) Type, Nowra–Braidwood Road 200m north of the Tomerong intersection, June 1987. R. G. Tunstall, 202 (holotype C.B.G.).

Rosette of non-flowering plant with 3 to 4 ovate shortly stalked leaves at the top of a 3cm stem. Flowering plants up to 40cm tall (average of plants seen) the stem leaves, 5 to 8, 8cm X 5cm, lanceolate, apex acuminate, dark green. Flower stem slender and wiry, bearing up to 6 green and white flowers occasionally with brown tips, 17mm long X 5mm wide. Galea curved at its base then straight for ⅔rds its length, abruptly rounding to its tip. Lateral sepals deflexed back to the ovary, connate for ⅔rds their length separating at its distal ⅓rd into acute brown tips, margins somewhat incurved. Labellum 5mm X 2mm, brown marked dark brown, obscurely 3 lobed at the apex, bifid and markedly upturned, the whole of the lamina like velvet with very few slightly longer cilia present. Labellum almost reaches the column wings in the tripped position, very irritable.

SELECTED COLLECTIONS

Jervis Bay Road, E. and L. I. Cady 13/6/1959; Nowra-Braidwood Road, R. G. Tunstall, 7/1988; 6/1992; Seven Mile Beach, E. and L. I. Cady, 6/1985; Manning Lookout, R. G. Tunstall, 6/1988.

DISTRIBUTION AND HABITAT, N.S.W.

In scattered groups or singly in sheltered sclerophyll forest, usually dampish, growing in grassy areas amongst ferns and light undergrowth. Other species of orchids found in the area are *P. grandiflora, P. nutans, P. longifolia, Corybas* sp. (no flowers) and *C. unguiculatus.*

NOTES

This species generally flowers in June/July and can often be found growing with *P. longifolia. P. tunstallii* can be easily separated from *P. longifolia* (Fig. 3) by its distinct sterile rosette, rounder shaped flowers, lateral sepals deflexing to the ovary; the generally narrower apex to the obscurely lobed labellum, its almost naked look and its thicker basal ⅓rd.

At present *P. tunstallii* must be regarded as a rare species but with further studies of the complex, the range could be widened. It has been reported also from the Batemans Bay area.

REFERENCE

1. Clements M. A., Australian Orchid Research Vol. 1, 128 (1989).

Key to Fig. 2

Pterostylis tunstallii

To 2cm scale:
1 – Plant natural size;
2 – Flower side view X 2;
3 – Flower side view sectioned X 2;
4 – Flower front X 2;
5 – Labella top showing variation X 5;
6 – Labellum side X 5;
7 – Labellum tip X 7;
8 – Non flowering rosette natural size.

Key to Fig. 3

Pterostylis longifolia

To 2cm scale:
1 – Plant natural size;
2 – Non flowering rosette;
3 – Flower side and sectioned natural size;
4 – Flower side natural size;
5 – Labellum side X 3;
6 – Labellum top X 3;
7 – Labellum tip flattened X 7;
8 – Labellum tip variation X 7.

POLLINIA STORAGE

Place pollinia in a tissue in a tightly sealed bottle or tube and place in the refrigerator at approximately 8 deg. C. This should keep the pollinia viable for quite a few months.

Pollen does not, without some care, retain its vitality for any great length of time. I have successfully used the pollinia of numerous native orchids, both species and hybrids, stored in this way, for up to one year.

I find that if a flower is cut from the raceme before it starts to fade and placed in a vase without any water, the pollinia will remain in good condition for a few weeks, even after the flower has withered.

RELOCATING PHAIUS

Jim Male,
Iona Road, Beerburrum, Qld. 4517

Lester Ratcliffe and I took off for the trip to Noosa Waters talking and ignoring the speed we were doing on the four-lane highway. Just happen to notice a car going the opposite way which appeared to have headlight problems. Off comes the foot from the accelerator and sure enough, about a mile along there were the Government's revenue collectors. We took this to be a good omen for our search.

Arrived at Noosa Water and had a talk to the Site Manager who had no objection at all to us removing any native orchids we could find. He made us welcome. One got the impression that it was novel for someone to actually want to remove orchids from development sites, rather than lie down in front of bulldozers. This was my first trip, Lester having been before as part of the two-man Conservation Sub-Committee of the A.N.O.S. Queenlands Kabi Group.

Noosa Waters is a residential development at Noosa. There has been big bucks spent there. We went into 70 acres that is due to be bulldozed sometime in the near future. We were walking through grass about nine inches tall and and there were a few plants of *Pterostylis baptistii* in flower, the flowers not clearing the top of the grass. These were within a few metres of the cleared land for the power line. Closer inspection showed quite a few rosettes, but no flower spikes. We left them there until we were about to leave and I brought a few home to see if I could get a colony growing in my yard.

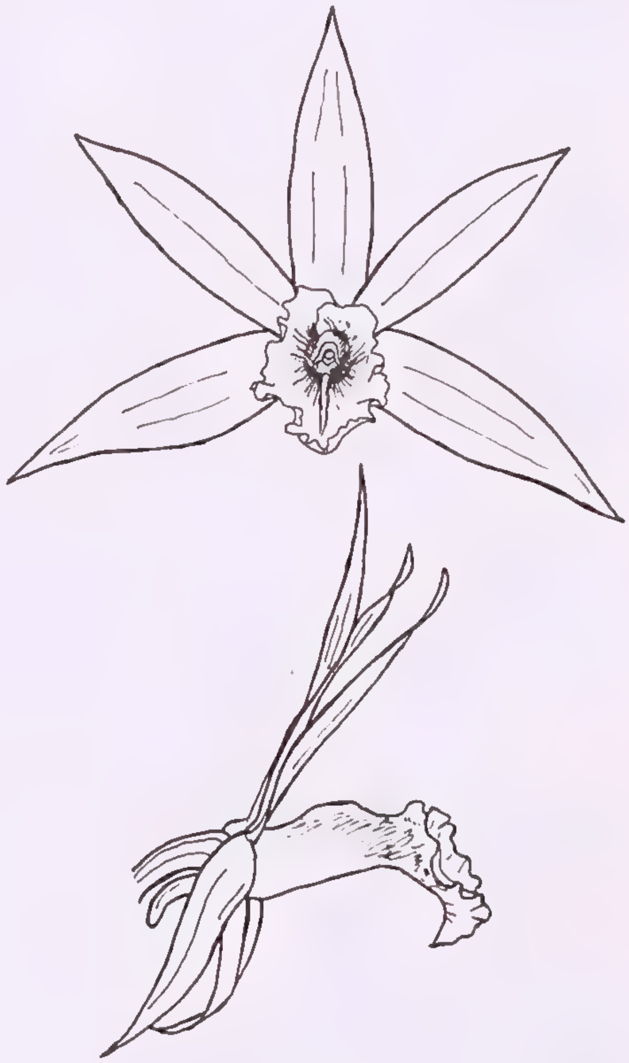
We struggled into the swamp. It is inconceivable to think that with drainage and filling, this could be prime real estate within a few years. We found many plants of *Phaius,* most under water; the coast has had a lot of rain over recent months. They were rotting off and whole bulbs had rotted away, but they must be tough, because the unrotted bulbs were starting to reshoot. Here the *Phaius* put their roots out laterally along the top of the ground with only leaf mould covering them. They were quite easy to get out of the ground.

Later on we moved up the ridge a little and came upon another colony, clear of water. Here the ground was black and sticky. The *Phaius* here had their roots straight down through the dirt. It made collecting very hard work. There was grass growing amongst them. Plenty of seedlings were seen. About 9" leaf span, down to 2", no bulb but plenty of small roots.

Earlier on, in the swamp, in a slight mound of dirt around the base of a tree, above water level, Lester found a colony of *Pterostylis* (about 20) that were unflowered. He took them home to grow to see what they were but we suspect that they will be *P. baptistii.* We also found five plants of *Cymbidium madidum* growing on tea trees, their roots growing through the bark. An unusual sight, Lester standing on my shoulders, scraping away with a short shovel to remove them.

We were there about four hours, including a lunch break and were very glad to get away. No leeches or ticks this time, but the mosquitoes gave me hell. Now we have to relocate the *Phaius.* Three were starting to spike so soon we will know if they are *P. tankervilleae* or *P. australis.* I leave it to the "splitters and lumpers" to name them. One of the problems we are facing is to find "SAFE" places to relocate them. There are not many places available that are manned to stop five finger discounting. One would have expected great cooperation from the local councils, but with the exception of the Noosa Shire Council, there is no co-operation.

If anyone knows of a safe place to relocate some of these, in an environment that they will grow in, please contact us. In the meantime, the A.N.O.S. Queensland Kabi Group, will keep trying.



Phaius tankervilleae — ½ natural size.

A.N.O.S. CENTRAL COAST GROUP SPRING SHOW

Gary Sweikert,
14 Dogwood Close,
Wyoming, N.S.W. 2250

The Twelfth Annual Spring Show of the Central Coast Group was held on 5th and 6th of September at Gosford. There was a total of 305 plants benched with hybrids outnumbering species. We have had a cold winter persisting into early spring, compared to the past two years. This has had a marked effect on both the quantity and quality of flowers displayed. *Dendrobium speciosum* in particular was conspicuous by its absence of flowers.

Well known grower and local group member, Neil Finch, was happy he benched this year, as he won a major portion of the prizemoney. His plant of *D. Yondi* (Plate 10) was judged Grand Champion as well as best hybrid. It had ten tall canes carrying 16 racemes each holding on average 10 flowers. The flowers were a shell pink and 31mm across.

Reserve Champion was a good yellow *D. Miara* (Plate 11) owned by Neil. Best Species plant was a cream, medium sized *D. speciosum* var. *curvicaule,* also owned by Neil Finch.

Best Specimen plant was a magnificent 30cm pot of *D. Bardo Rose* with at least 100 racemes of deep pink colour, owned by Phil Spence. Local grower Murray Smith was delighted with Best Species seedling awarded to his plant of *D. kingianum* 'Albert West' X 'Ron', a medium sized pink with darker lip. Of note was the fact that this *D. kingianum* beat a first flowering *D. speciosum* 'National White' X self, which had taken about 15 years to flower. Prospective *D. speciosum* growers, don't be put off by this.

The *D. kingianum* class was way down on numbers, most plants had smaller than usual flowers, the winner was a well grown 140mm pot of *D. kingianum* 'Speckles' HCC/AD/ANOS with well marked flowers, again owned by Neil Finch.

D. speciosum var. *speciosum* 'Yondi' was a clear winner in its class. This plant had large white flowers well spaced on long arching racemes, but the flowers were not open fully. Neil Finch was happy with this plant considering the seasonal problems this year. The *D. X gracillimum* class was disappointing this year, obviously the *D. speciosum* in the breeding has held it back. The winner of this class was a big yellow flower on a strong raceme, using *D. speciosum* var. *grandiflorum* in its breeding — owned by Vern Frampton.

D. gracilicaule put on a good show without being outstanding. There were only two plants benched of *D. falcorostrum.* This class has been disappointing on the Central Coast the last few seasons. Allan Peck, as usual, had some nice *D.* Elegant Heart's benched in class 9, the winning plant was a floriferous clone with maroon-pink and yellow flowers.

It was a bit early for *Sarcochilus,* but those on display showed promise for later years, especially the hybrids. John Andrews had a florific *S. olivaceous* and Gary Sweikert's first flowering *S.* Melba created a lot of comment. The *Dendrobium* Bardo Rose class was down on numbers, although there were a few good plants. Neil Finch again was successful with a nice pink. There was, as usual a good display of *D. X delicatum,* both first and second in this class were outstanding man-made hybrids. First went to Neil Finch for a *D. kingianum* 'Betty' X *D. speciosum* 'Windermere' cross, a nice splash petal deep pink with an upright raceme. John Andrews' second place had bigger flowers although not quite open when judged, upright spikes of cream flowers with a well marked purple labellum.

Other hybrids of note were *D.* King Wong — a nice pink with a dark purple lip owned by Ken Smith. Class 17: Hybrids with *D. tetragonum* parentage attracted one's attention with many good sized plants. *D.* Miara, *D.* Hilda Poxon, *D.* Star Delight and *D.* Graham Hewitt, were grown to perfection — the last three by Albie Sherwood, stood out like beacons. The First Flowering Hybrid Seedling class was well supported with many good coloured flowers mostly on small plants. *D.* Jesmond Glitter *(D.* Sunglow X *D.* Zip*)* owned by Geoff Eagar was outstanding and will be a sight to behold when it matures. Second place in this class went to Peter Farlow's *D.* Sarah Jane, one of the latest registered hybrids from Wal Upton, with about eight large cream-pink flowers on a single raceme.

The two terrestrial classes were well supported with 16 different species plants and three hybrid plants benched. First places went to a nice pot of *Pterostylis curta* and *Caladenia catenata,* owned by John Andrews and Murray Smith respectively.

The show was a great success, the public were most impressed.

A.N.O.S. INC. PORT HACKING GROUP
6th ANNUAL SPRING SHOW — 6th SEPTEMBER, 1992

By Steve Griffiths

Best *Dendrobium speciosum*

The winner of this class was *D. speciosum* 'Fry' owned by Neville Roper. Most noticeable was the Huntsman spider at the end of the raceme.

Best *Dendrobium kingianum*

Won by *D. kingianum* 106DW No. 3 exhibited by Neville Roper.

Best *Dendrobium* Species — Section *Rhizobium*

Won by *D. pugioniforme* exhibited by Dennis Wood.

Best *Dendrobium* Species — Other

A *D. aemulum* owned by Dennis Wood won this class and the second place went to a magnificent and large plant of *D. aemulum* owned by David Hicks which was also the Champion Specimen of the show.

Best *Dendrobium* Hybrid — Predominantly Yellow or Green

A well patronised and very competitive class. Won by Col Brandon's *D.* Kalang 'Buttercup' (Plate 15) which also became Best Hybrid and Champion of the Show. Two other notable plants in this section were *D.* Karsun and *D.* Peter also owned by Col Brandon.

Best *Dendrobium* Hybrid — Predominantly Pink or Red

Another well patronised section, won by Dennis Wood's *D.* Sofala. Neville Roper's *D.* King Falcon was second.

Best *Dendrobium* Hybrid — Predominantly Any Other Colour

Another popular section. Won by Col Brandon's *D.* Karsun; an interesting feature of the flower is that the labellum carries most of its red markings on the outside. Other noteworthy exhibits were *D.* Wyagdon (*D.* Peter X *D.* Nooro) with four enormous flat flowers owned by Col Brandon and *D.* Karloo owned by Neville Roper.

Best *Dendrobium* Hybrid — *Phalaenanthe* Parentage

Won by an extremely attractive clone of *D.* Elegant Heart owned by Dennis Wood.

Best *Dendrobium* Hybrid — Section *Rhizobium*

Won by *D.* Jiggi X *D. pugioniforme* owned by Dennis Wood.

Best Seedling

First place went to (*D.* Graham Hewitt X *D.* Kingrose) X *D.* Peter owned by Neville Roper, chunky white flowers of heavy substance. Second place was given to a *D.* Hilda Poxon with very large clear green flowers. Other notable seedlings benched were — *D.* Peter X *D.* Gracious Falcon, large good substance creamy yellow flowers and two plants of *D.* Yondi Brolga with solid flowers in varying tones of pink.

Best *Sarcanthinae* Species

Won by a very early flowering red centred form of *Sarcochilus hartmannii* owned by Col Brandon.

Best *Sarcanthinae* Hybrid

A surprisingly large number of entries for the time of the year, all of high standard. Won by a dainty pink and red centred *Sarcochilus* Pinkhart X *S. hartmannii* exhibited by Col Brandon. Another of Col Brandon's plants won second place, a fine pale form of *S.* Lois. Other interesting entries were *S.* Pinkhart X *Plectorrhiza tridentata* with dainty red and pink flowers and a solid red form of *S.* Pinkhart X *S. fitzgeraldii.*

Best *Diuris* Species

A *Diuris laxiflora* from Western Australia; golden yellow with dark brown suffusions won first prize. *D. lanceolata* originally from Canberra, was second, sulphur yellow flowers with orange markings on the labellum. Both plants owned by Steve Deards.

Best Terrestrial Species — Not Elsewhere Included

A pot containing two plants, *Caladenia platachila* and *Caladenia hillmanii,* the latter only recently described. Owned by Steve Deards.

Best *Diuris* Hybrid

Diuris Pioneer (*Diuris corymbosa* X *Diuris maculata*), owned by Steve Deards.

Best Other Orchid

A very floriferous plant of *Bulbophyllum gadgarrense* owned by Neville Roper.

Best *Dendrobium* Species — Novice

Won by Fred Brunning's *D. kingianum* 'Wilson'.

Best *Dendrobium* Hybrid — Novice

First Fred Brunning's *D.* Gulginni and second to David Currie's *D.* Ellen.

Best Orchid — Junior

It was pleasing to see a section devoted to junior members for the first time. The plants benched were of a very high standard. First Grant Wood's *D.* Wykar and second Greg Wood's *D. kingianum* 106, very dark red attractive flowers.

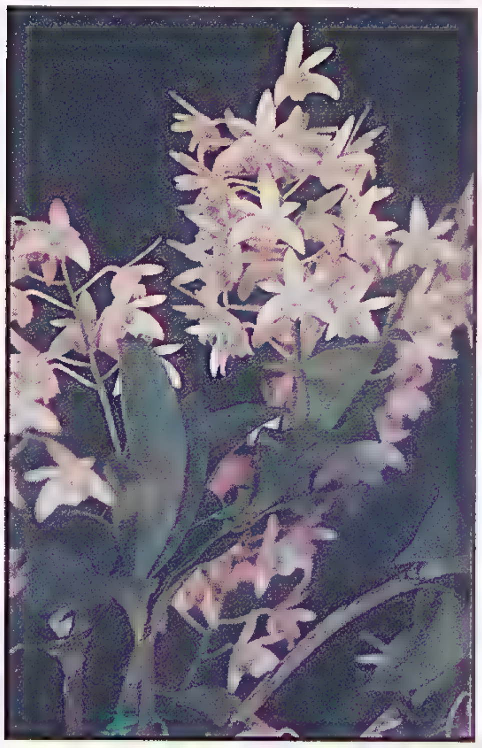


Plate 10: *Dendrobium* Yondi. Photo: J. Turner.

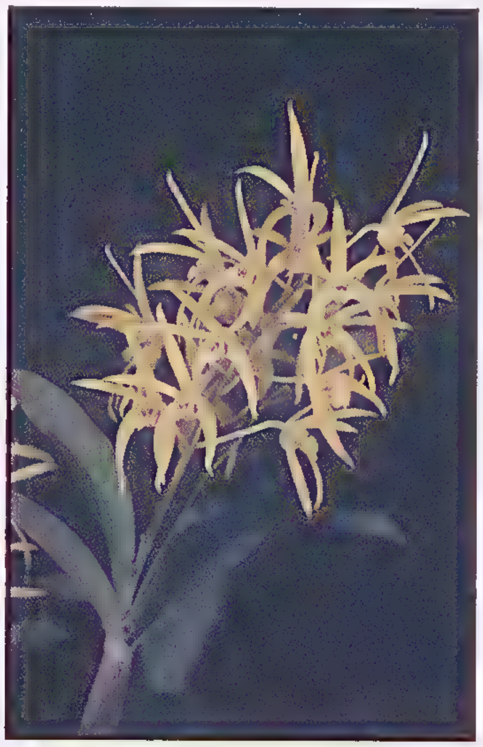


Plate 11: *Dendrobium* Miara. Photo: J. Turner.

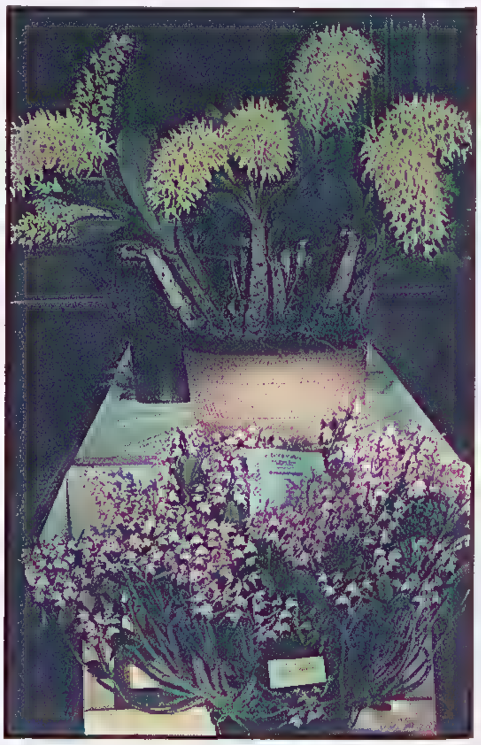


Plate 12: *Dendrobium speciosum* 'Windermere' above and *D.* Bardo Rose. Photo: D. Titmuss.

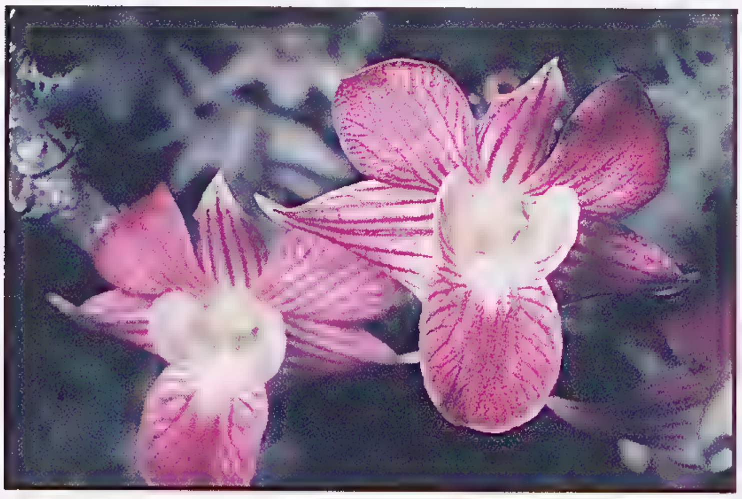


Plate 13: *Dendrobium* Dalvey. Photo: D. Titmuss.

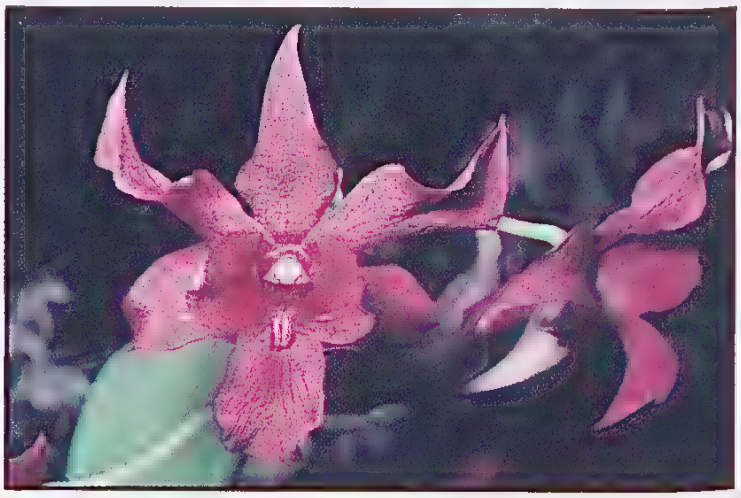


Plate 14: *Dendrobium* Violet Amagi. Photo: D. Titmuss.

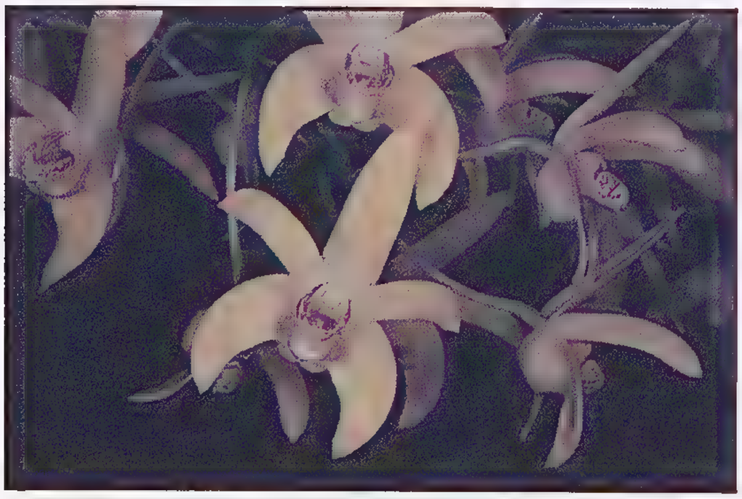


Plate 15: *Dendrobium* Kalang 'Buttercup'. Photo: R. Napier.

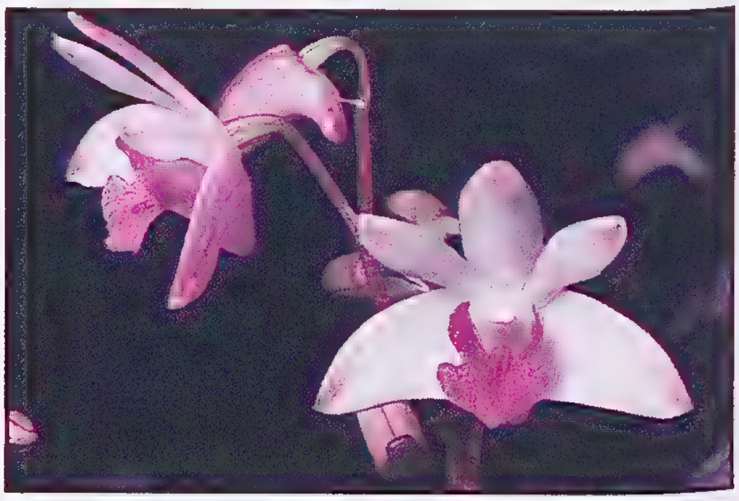


Plate 16: *Dendrobium kingianum* 'Steve' AD/ANOS. Photo: D. Titmuss.

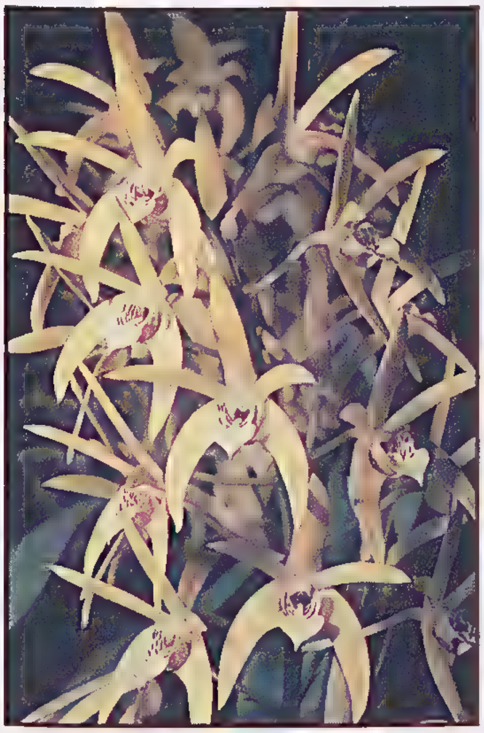


Plate 17: *Dendrobium* Star of Riverdene 'Amanda'.
Photo: D. Titmuss.

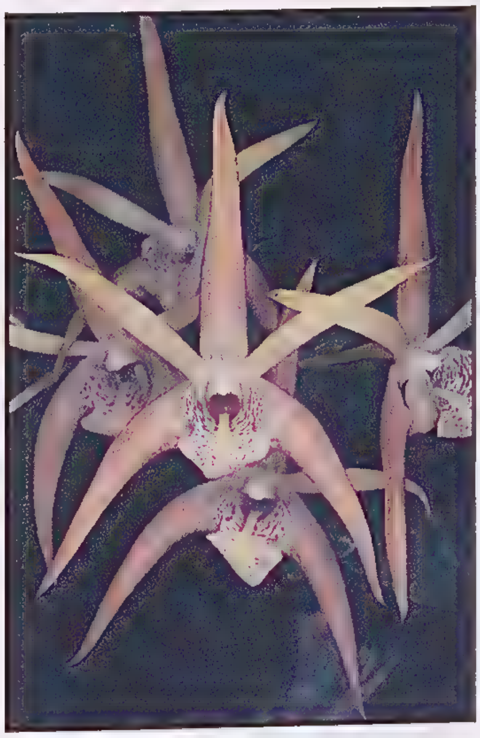


Plate 18: *Dendrobium* Elegant Sunset.
Photo: D. Banks.

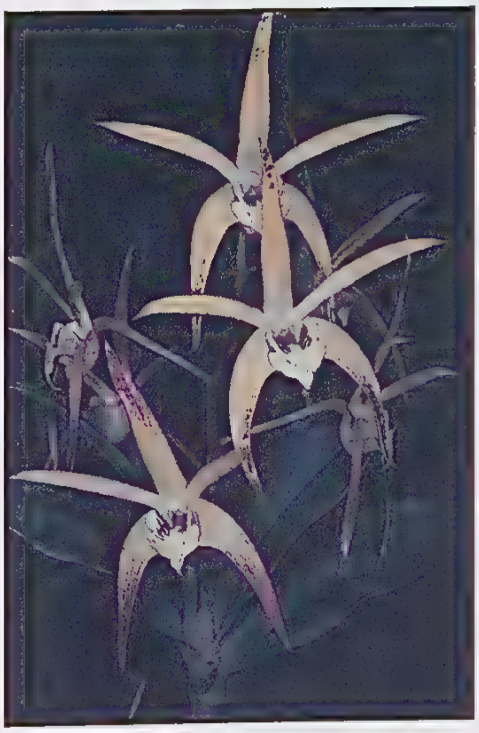


Plate 19: *Dendrobium* Yondi Pioneer.
Photo: D. Banks.

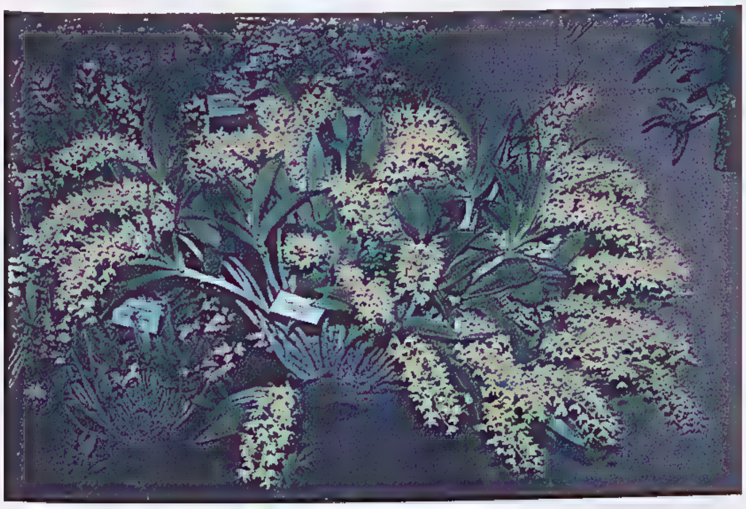


Plate 20: *Dendrobium X gracillimum.*
Photo: L. Peggie.

Plate 21: Terrestrial Display Victoria Group.
Photo: L. Peggie.

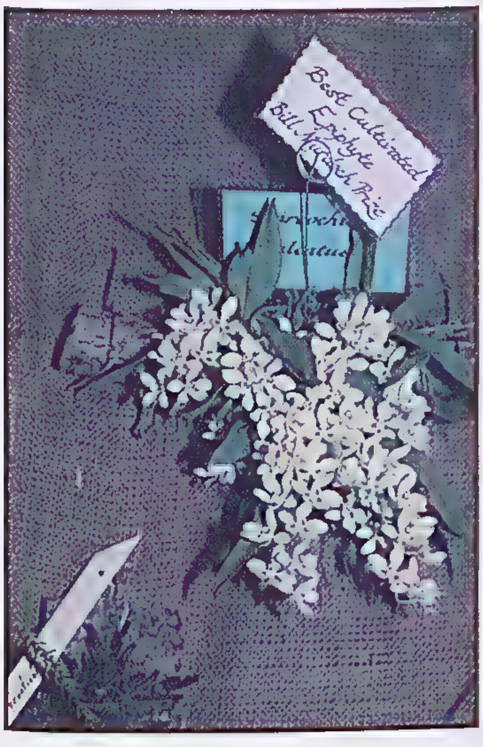


Plate 22: *Sarcochilus falcatus.*
Photo: L. Peggie.

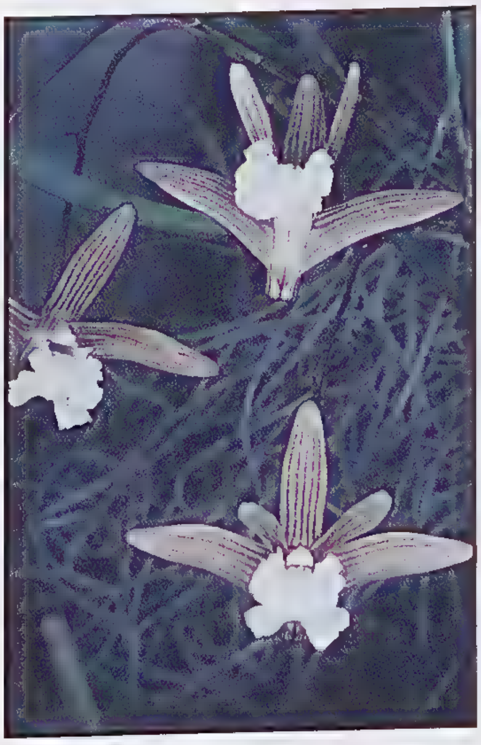


Plate 23: *Dendrobium striolatum* 'Ruffles' HCC/ANOS.
Photo: D. Banks.

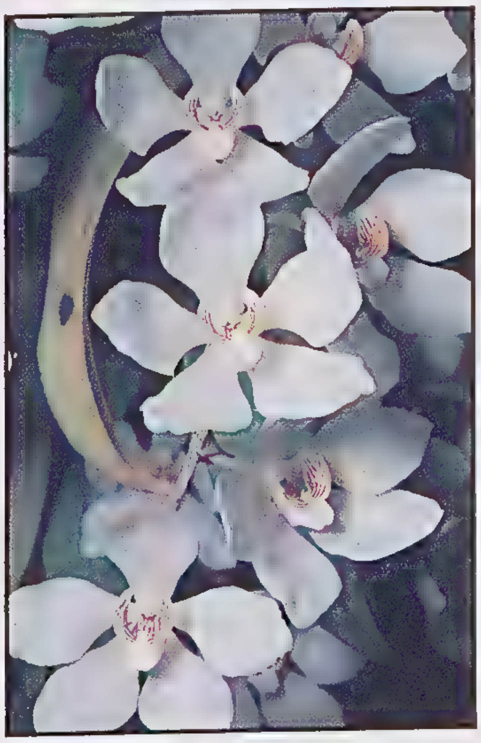


Plate 24: *Sarcochilus falcatus.*
Photo: D. Titmuss.

A.N.O.S. SYDNEY GROUP INC. 10th SPRING SHOW

Michael Harrison,
President,
A.N.O.S. Sydney Group

Our 10th Annual Spring Show, held on the weekend of 19th and 20th September, was the finest display of quality native orchid species and hybrids that I have yet seen. There were top notch plants benched in every class and the judging of several of the hybrid sections in particular, must have really tested the A.N.O.S. Judges. The competition was intense and with so many marvellous plants it was only the very best that won prizes.

Champion Native Hybrid was awarded to Ron Findlater's *Dendrobium* Star of Riverdene 'Amanda', (Plate 17), and to my mind this was the outstanding plant of the show. Ron has that special ability to grow and flower his plants to their full potential and this superb specimen carried seven erect or arching racemes loaded with golden yellow flowers, each averaging about 50mm tall. In keeping with this style of hybrid, the flowers were widely opening and essentially star-shaped, but they had wide segments and heavy texture. It was the sheer number of flowers on the entire plant that was so impressive, the overall effect being that of a glowing golden halo above the foliage. Bred originally by Sid Batchelor, it was one of those plants that caught the eye from the other side of the hall by its size and presence.

As in previous years, it was those plants on display in the section for first flowered seedlings that really gave us an insight into where our native hybridists are heading. I was especially taken by *D.* Elegant Sunset (Plate 18) (*D.* Suzanne X *D.* Star of Gold), of which there were no fewer than six plants benched here. Not only was the quality of the highest order, but the variety in shape and colour was amazing, with flowers ranging from burnt orange, through yellow to pink and one plant with white segments and a solid pink lip. David Butler took first prize in the section with a *D.* Yondi Pioneer (Plate 19) (*D.* Aussie Bonanza X *D.* Star of Gold), with two perfectly erect inflorescences carrying lovely bronze-orange flowers. In all, there were over 60 plants benched in this section, showing just how much interest there is in obtaining and growing-on seedlings in the hope of getting that special one.

There really were simply too many plants to go into any great detail about the hybrid sections, apart from saying that every year the quality seems to improve. Some of the colours coming through now are really beautiful and in some cases it is difficult to tell where they are coming from.

Champion Specimen Hybrid Orchid was granted to Eric Webeck's giant *D.* X *delicatum* 'Bungan Castle' and Eric also benched a very large potful of his delightful *D.* Bardo Rose 'Bungan Castle' with its deep pink flowers on pendulous racemes.

For the second year in a row, Champion Native Species went to Neil Finch's *D. kingianum* 'Speckles' HCC/AD/ANOS and again it showed just why it is such a good clone. The substance and shape of the flower are just about as good as you get and the lovely dark pink speckling on the face of the flower is very appealing. Neil also benched several other very fine dark purple clones of *D. kingianum* which attracted a lot of attention. Also of note was Sid Batchelor's large plant of *D. kingianum* 'Steve' (Plate 16), to which the A.N.O.S. judges granted an Award of Distinction, for its unusual full-coloured dark purple labellum.

In the section for terete-leafed dendrobiums, Neil Finch benched a very large flowered form of *D. striolatum* (Plate 23) to which he had given the clonal name 'Ruffles', in recognition of its very wide, ruffled labellum. This plant is one of his 'Neville' X 'Redback' breeding line and was of such quality that it was awarded an HCC by the A.N.O.S. judges.

Elsewhere in the section for species orchids there were some outstanding plants. Roger Phillips had an excellent *D. discolor,* which carried a lovely arching inflorescence of large well-shaped flowers and Gerry Walsh benched a fine *Sarcochilus olivaceus* with two pendulous racemes about 15cm long. Gerry also took out the prize for Champion Orange Blossom Orchid with one of his plants of *S. falcatus* (Plate 24).

Champion Specimen Species was granted to John Andrews for a superbly grown 300mm potful of *Dendrobium gracilicaule,* which had flowers all over without any bare or sparse patches. This plant is worthy of further mention because it received the inaugural presentation of the Don Barnham Perpetual Trophy for Champion Specimen Species Orchid.

Don Barnham was an inaugural member of A.N.O.S. Sydney Group and he was made a Life Member in 1983. His advanced years now prevent Don from attending meetings on a regular basis, but we still see him several times a year and he invariably puts in an appearance at our spring shows. Don was renowned for growing specimen plants and the committee felt it would be a fitting gesture to introduce a perpetual trophy to honour Don, both as a valued member and in recognition of his abilities as a grower of native orchids. When I asked him, Don said that not only would he be honoured by this trophy, he would very much like to make the inaugural presentation himself.

I thought the highlight of the show was the presentation of this trophy. Don Barnham told how he had begun to grow native orchids into specimen plants many years ago, in order to be able to put on good displays which would be competitive with exotic orchids. He also spoke about the early days of A.N.O.S. Sydney Group and I realised how important it is to have members like Don who are a link between the past and present. We are privileged to have Don as a Life Member of A.N.O.S. Sydney Group.

WOLLONGONG AND DISTRICT NATIVE ORCHID SOCIETY INC. SPRING SHOW — 25th to 27th SEPTEMBER, 1992

by Russell Lea

This year's show was a new adventure for our society. Unable to hold it in a shopping centre as previously, we were faced with the problem of finding a new and suitable venue. After much discussion and thought, Steve Pople of the Botanic Gardens, Wollongong, came to the rescue. Steve offered to host the show in conjunction with their annual event, "Spring in the Gardens".

Our display was housed in a large marquee in the grounds of the Botanic Gardens.

The night before our set-up day the marquee was blown apart by gale force winds. It was with some apprehension that we began to set-up our show on the Thursday afternoon, within a new and improved tent.

Members and plants arrived, all willing to help. By late afternoon the majority of plants had been benched. We now needed a few fine days, a crowd of visitors and no gale force winds.

We got our fine days and many interested people, all keen to learn about the beautiful orchids growing in their own country. There were many enquiries about the perfume, the unique nature of the flowers and cultural information. The public appreciated our beautiful native orchids and the friendliness of our members. Thank you and well done to our members who helped.

The major prize winners were:–

Grand Champion and also **Champion Native Hybrid** and winner of the **Ira Butler Trophy** —
Dendrobium agrostophyllum X *D. semifuscum* owned by Ron Wheeldon.

Champion Australasian Species or Hybrid
Dendrobium subclausum owned by Ron Wheeldon.

Champion Native Species of Show
Dendrobium linguiforme var. *nugentii* owned by Bruce Porter.

Best *Sarcochilus falcatus* — Peter Gough Memorial Trophy
Owned by Bruce Porter.

Best *Dendrobium* Species Seedling — First Flowering — Ken Russell Perpetual Trophy
D. kingianum 'Cuppa' X *D. kingianum* 'Big Pink '69' owned by Rob Trevenar.

Best Cultured Orchid
Dendrobium ruppianum owned by Alby and Thelma King.

Best Seedling — First Flowering — (excluding *Dendrobium* species)
Sarcochilus Kilgra owned by Tom Gray.

A.N.O.S. WARRINGAH GROUP INC. SPRING SHOW — 11th–13th SEPTEMBER, 1992

by Ruth Rudkin

A new location, fine weather, good advertising and a fine sense of co-operation among the members of the Warringah Group of A.N.O.S. ensured that the Spring Show of '92 was one of the best ever. The Forestville Memorial Hall at Starkey Street, Forestville, on the corner of a main road, plenty of parking proved to be an ideal place. It is light, airy, spacious and easily seen from the road.

Although it has been a bad year for *Dendrobium speciosum* Neil Finch's magnificent *D. speciosum* 'Windermere' (Plate 12) with its several large racemes of beautifully shaped yellow flowers, welcomed all the visitors as they entered the hall. It was judged Champion Native Epiphytic Species and Grand Champion of the Show. Two other eye-catching specimen plants were Eric Webeck's pink *D.* X *delicatum* (Champion Specimen Native Hybrid) and P. and Y. Spence's *D.* Bardo Rose (Plate 12). Champion Specimen Native Species and the W. Murdoch Award went to a novice, Kay Dobson for her beautifully flowered *D. striolatum.*

Champion Australian Native Hybrid was Neil Finch's *D.* Miara, with its well-shaped clear yellow flowers which will also get the Ira Butler Trophy, while the Australian Native Terrestrial Species Champion was Jim Lykos's handsome *Diuris platichila.* The beautiful dark red *D.* Violet Amagi (Plate 14), an eye-catcher in the display of P. and Y. Spence, was the Champion Australasian Hybrid.

Of particular interest were the First Flowering Seedlings, the shape of things to come. first was Neil Finch's *D.* Jesmond Gem followed by B. Fletcher's *D.* Star of Gold 'Bathurst' X *D.* Peter 'Citron' No. 1 and the eye-catchers, Neil Finch's *D.* Yondi X *D.* Zip and Roger Bedford's *D.* Elegant Lace. Our youngest hybridist, ten-year-old Andrew Spence, benched a creditable

D. Ellen crossed with a large yellow *D. speciosum* in the Novice Section.

Other notable section winners were Neil Finch's *D. kingianum* 'Speckles' HCC/AD/ANOS, first in the *Dendrocoryne* Section and his *Dendrobium kingianum* 'Speckles' X *D. kingianum* 'Bicolour' first in the First Flowering Species Section. Two unusual species were Mick Korzenowski's pink flowered *D. roseipes* and *D. bulbophylloides* with two tiny perfect flowers.

Plate 13 shows an interesting hybrid owned by T. and D. Morrisey, *D.* Dalvey (*D. bifalce* X *D. bigibbum*).

Brightening up the stage were five displays, P. and Y. Spence winning the large display section and Ray Young the small. Along the side of the hall was a massive display of orchids in flower for sale, thanks to all those who brought in plants. There was an ever changing number of sales persons to help Mick Korzenowski. The whole Show was a credit to the Show Marshall, Chris Arnott, Show Secretary Bob Lowe, President Jim Bailey, Treasurer Joan Cook, David Buxton, Sam and Elizabeth Point and the innumerable ordinary members of Warringah Group.

A.N.O.S. VICTORIAN GROUP INC. SPRING SHOW — 3rd–4th OCTOBER, 1992

by Loris Peggie,
34 Jolimont Road, Forest Hill, Vic. 3131

Victoria's long, cold, wet season had the Show Committee rather worried as so many plants that were normally bearing many racemes of lovely flowers were all in bud and did not seem to be making the effort to show their beauty for the Spring Show. However, some plants, usually finished, were at their peak adding a little variety to the display.

It had been decided to feature the terrestrials (Plate 21) down the centre of the Herbarium this year and they certainly made a great feature. The 'spider' caladenias were particularly attractive and a spectacular display of *Glossodia major, G. minor* and some *G. major,* alba form, attracted the attention of the crowd.

The walls and side tables were all lined with epiphytes, the perfume was quite overpowering and the masses of colour magnificent. Each year more hybrids are benched extending the colour range and flower shapes giving members a talking point.

The show opened on a lovely sunny day encouraging a good attendance. The sales area was very popular with many early birds buying up the best of the plants. Sunday was not quite so pleasant with a steady shower for most of the day but it did not deter people from attending and the hall was comfortably full the whole day.

Although A.N.O.S. Victoria is a non-competitive society, on the occasion of our Spring Show special cultivation awards are selected. The winners in 1992 were:–

The Phil Mims Prize for the Best Cultivated Terrestrial — Russell Brown for *Glossodia major.*

The Bill Murdoch Prize for the Best Cultivated Epiphyte — Peter Nash for *Sarcochilus falcatus* (Plate 22).

The Dingley Fern Market Prize for the Best Cultivated Hybrid — Eric Wilde for a spectacular specimen plant of *Dendrobium* X *gracillimum* (Plate 20).

Cultural Certificates were awarded to: Helen Richards for *Thelymitra* X *chasmogama, T. epipactoides.* Malcolm Thomas for *Caladenia filamentosa* var. *denticulata, C. chapmanii, C. huegelii, C. fragrantissima.* John Evans for *Dendrobium striolatum.* Godfred Oesch for *D.* Eureka X *D.* Kim. Alex and Helene Wild for *D.* Dainty Cascades.

GROUP SECRETARIES PLEASE NOTE

Visiting judges may not be familiar with your show venue and they sometimes travel long distances and give freely of their time and knowledge. It would therefore be polite if judges were written prior to your show and advised time, date, venue, explicit directions for travelling (a small map would help) and advise if judges will be offered refreshment and what time. They have to plan their day for your orchids sake.

GROWING HINT

If overwatering takes place when roots are imprisoned in a pot, the roots, having no reason to search for moisture, stay still, with the result they quickly exhaust the food supply in the vicinity of that small area of root. Without good drainage, excess moisture sours the growing media.

The roots consist of a spongy sheath with a slender central fibre. The function of the many layered spongy tissue is to quickly soak up moisture and hold it for use by the plant.

The roots of epiphytic orchids in their natural state do not reach the ground, but mainly serve as a means of attachment; they frequently contain chlorophyl and perform in part the function of leaves.

JOHN EASTON AWARD 1991 MAX GIBBS OF TAUPO

[Ed.—Reprinted from *Orchids in New Zealand* Vol. 18, No.2]

Mrs Christine Irwin,
Secertary:
The John Easton Award Committee

This prestigious Award administered by the Hawkes Bay Orchid Society is the only one of its kind in New Zealand and nominations are open to all members of societys' affiliated to the Orchid Council of N.Z. The Award is made annually for "the most outstanding contribution to the culture and promotion of orchids in New Zealand".

The Committee this year under the chairmanship of Mr W. Ross-Taylor were pleased to announce that Mr Max Gibbs of Taupo would be the recipient. Max is president of the Taupo Society and has tremendous support from the members and many societies, giving of his time and expertise to many orchid growers and native orchid lovers.

Max has been a native orchid enthusiast for 30 years. He is employed by the DSIR as an analytical chemist but has many other talents as well. He is a skilled photographer, a talented artist and illustrator and has the ability to write in a style that is easy reading. This writing ability is apparent in the many articles he has had published in New Zealand and Australia on native orchids.

He was the first person to recognise the extent and importance of the area at Iwitahi where he found almost 30 different native orchids. It was Max, through his ability to put into words, both written and spoken, and his enthusiasm for the need to protect our native orchids that resulted in the first New Zealand native orchid reserve being declared by Timberlands in the Bay of Plenty.

Max spends much of his free time at Iwitahi or in other areas looking for and usually finding further habitats of his beloved native orchids. He has erected many wire netting cages to keep off browsing animals from the rare orchids.

Max works closely with Dr Brian Molloy in identifying some of the orchids from this area that do not readily fall into any printed description or illustration. He is the leader and organiser of the annual open day at Iwitahi each December where hundred of people have seen the native orchids and had their knowledge and enthusiasm increased.

Max is developing at his home a special collection of our native orchids to enable him to study them more closely and to display them to other enthusiasts. He is always willing to help and share his knowledge freely. He is quietly spoken yet when talking to a meeting holds the attention of his audience. He could be described as a "gentle" man.

SCHOENORCHIS DENSIFLORA

Roy Gifford,
2 Warrah Street, Ettalong, N.S.W. 2257

To the lover of miniature perfection, this tiny Sarcanthid is a gem to be cossetted and treasured.

The species has thin stems 1–2mm in diameter, with alternate leaves persisiting on at least the apical two thirds of each stem. Leaves are 3–6cm long, about 2mm across, very thick and fleshy with a deep central groove.

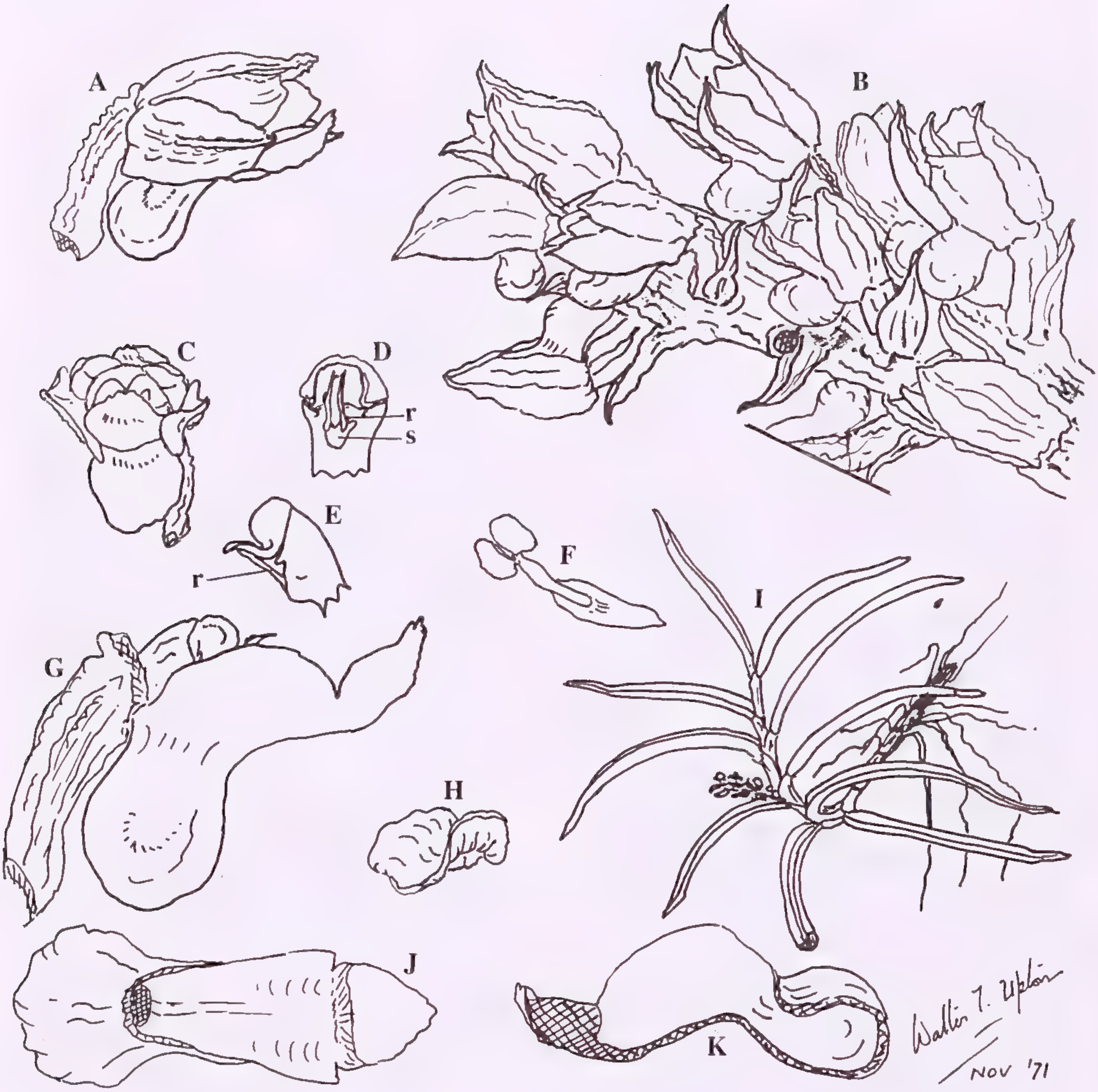
Plants branch freely, usually from eyes fairly low on the parent stem and inexperienced observers often take the plant to be sympodial in growth habit. This error is also helped by the plant producing the great majority of its roots from low down on the stems.

Roots are numerous and thin, the higher ones usually clinging to the stem, or other roots, until they reach the plant's substrate. Adventitious roots from high on the stem are rare with this little chap. Racemes are produced from leaf axils, often 4–6 per healthy stem and a well grown clump will have an astounding number of blooms. Racemes are about 3cm long, two thirds of which is rachis and there are usually 20–30 blooms per raceme. Blooms do not open widely and look a bit like a tiny upside down tulip. They are about 2mm across and are pure white. Under a 10x glass and in good light, they sparkle as if dusted with sugar. A well grown and flowered plant is truly a joy.

The species grows naturally as an epiphyte on rainforest trees, usually close to streams, in the foothills of the eastern ranges of north Queensland from around Ingham up to the Bloomfield, or further north. It is found in New Guinea, so probably once grew right up Cape York wherever there was rainforest.

With the growth of secondary — and tertiary — stems, plants become pendulous, forming tangled clumps about 15cm long. In the tropics plants grow well in bush houses, mounted on tree fern slabs, or in small terracotta pots, kept always damp and given about 60–70% shade.

In more temperate areas the species needs some warmth in winter — a minimum of 12°C — about 50% shade and constantly moving air, with relatively high humidity. I grew them always on slabs of tree fern fibre (*Cyathea cooperi*), kept associated mosses always green and damp, fed freely with weak fertilisers and had masses of flowers for about six months of the year — late summer to early spring. They need only a slab 10cm x 7.5cm, so take up very little room and are a most rewarding little native.



Schoenorchis densiflora **Schltr.**

A – Flower, side view 10X
B – Top of raceme 8X
C – Flower, front view 10X
D – Column, front view 10X
E – Column, side view 10X
F – Pollinarium, greatly enlarged
G – Column and labellum, side view 16X
H – Anther 16X
I – Plant ⅔rdsX
J – Labellum, from above 16x
K – Labellum, side view cross section 16x
r. – Rostellum
s. – Stigma

THE WALLACE LINE DEBATE

[Ed.—Reprinted from *The Orchidophile* — Sydney Group Bulletin, July, 1992]

Greg Steenbeeke, B.Sc.(Hons.), Dip.Ed.,
13 The Boulevarde,
Warrimoo, N.S.W. 2774

Alfred Russell Wallace was one of the contemporaries of Charles Darwin and likewise is accredited with having also developed the concept of biological evolution, though independently from the latter. For this reason he and Darwin were locked in continual combat, as the Linnaean Society refused to credit one or the other with the idea. His exploits in Malaysia in the 1850's resulted in him also collecting an enormous range of organisms, including some 8,500 species of animals.

He noted in his biography "My Life" the following extract:–

> "In this archipelago there are two distinct faunas rigidly circumscribed which differ as much as those of Africa and South America and more than those of Europe and North America, yet there is nothing on the map or on the face of the islands to mark their limits. The boundary line passes between islands closer together than others belonging to the same group . . . In mammals and birds the distinction is marked by genera, families and even orders confined to one region: in insects by a number of genera and little groups of peculiar species, the families of insects generally having a very wide or universal distribution" (*in* Rentoul, 1985).

Of orchids, Wallace had this to say:–

> "Their usually minute and abundant seeds would be as easily carried as the spores of ferns and their frequent epiphytic habit affords them an endless variety of stations on which to vegetate and at the same time removes them in a great measure from the competition of other plants. When, therefore, the climate is sufficiently moist and equable and there is a luxuriant tropical vegetation we may expect to find orchids plentiful on such tropical islands as possess an abundance of insects adapted to fertilise them and which are not too far removed from other lands or continents from which their seeds might be conveyed" (*in* Rentoul, 1982).

So why should we consider accepting the Wallace Line as the natural boundary of the Australasian Region. After all, this would then include Sulawesi (Celebes) and Bali and all points to the east of a curved line including these two. It does not, however, include the Philippines. I propose to address points both for and against the acceptance of the Wallace Line boundary, dividing these into a number of categories.

GEOLOGICALLY
(or should I maybe say tectonically):

There is a reason to accept the boundary as being in that approximate location. The islands of the Indonesian archipelago have been formed at some stage in geologically recent time (about 40 or 50 million years) as a result of the collision between the Austro-Indian plate and the Asian plate. The denser material of the sea floor of the Austro-Indian plate was forced under the edge of the Asian plate, taken to depth and then melted. The resultant magma, being less dense than the solid rock, forced its way upwards and formed much of the volcanic island chain we now know as Indonesia (some, including myself, might exclude Sumatra, Borneo and Java, as these are connected by a shallow, flat ocean shelf to the rest of Asia. We can still see where the sea floor is disappearing under the edge of Asia by the presence just south of Indonesia of a deep ocean trench. For this reason all of the organisms in Eastern Indonesia (or at least their ancestral forms) must be considered as migrants. However, the family Orchidaceae, considered the most advanced (and therefore youngest) of all of the plant families is believed to have arisen within the last 30 million years, which makes it still younger than that part of Indonesia. On the eastern side, Australia and Niugini are also connected by a shallow shelf, while Timor and the Moluccas are only separated from this continent by a shallow trough. As Australia travels northwards the front edge is now beginning to crumple against Asia and the Philippines, producing a series of troughs and ridges, the natural boundary of which is between the Moluccas and Sulawesi, running southwards through the Banda Basin and passing between Timor and Flores (see Fig. 4). Wallace had no idea of the geological state of affairs, nor of tectonics, though his boundary approximates very closely that which I have just outlined. Differences occur with the island of Sulawesi and the chain that runs east of Lombok, including Sumba and Flores. These appear to be parts of Asia that have suffered similar crumpling to that described for the Moluccas. The possibility exists that they are part of the Austro-Indian Plate, though the size and depth of the Sunda Basin makes this unlikely.

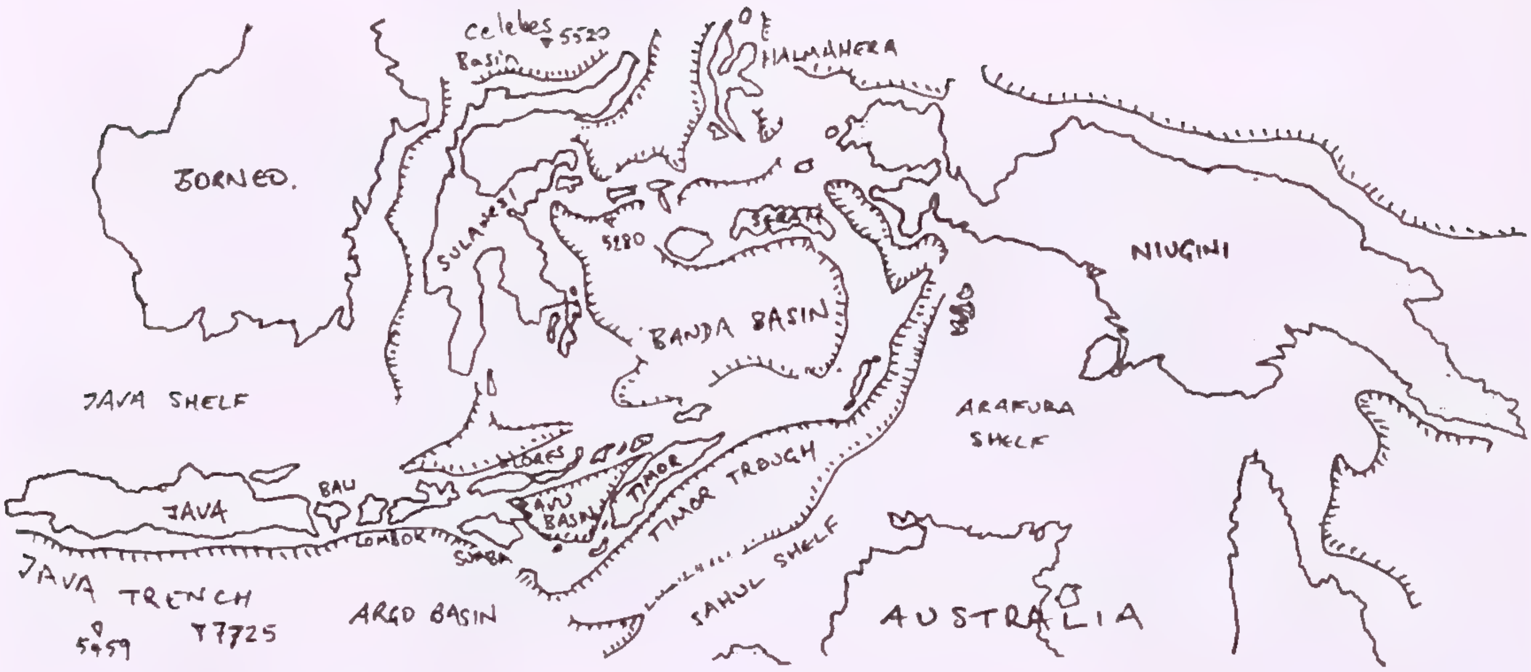


Figure 4 — The state of the ocean floor between Australia and South-East Asia.

BIOLOGICALLY:

As previously mentioned, it was Wallace that originally outlined the differences between organism groups in the two parts of the archipelago. His observations can still receive a reasonable amount of support even today, when we notice the distinctly Australasian families and the distinctly Asian families and note the approximate boundary between the two. However, with plant taxonomy the division into families could be considered equivalent to the order division in animals. In plants there are usually a lot more members to the family than in animals and the number of genera in a plant family equates more closely to the number of families in an animal order. Likewise, the division (or similarity) on physical characteristics also show a similar pattern. The members of a plant family are often a lot more dissimilar to each other than the members of an animal family.

So, why did I just waste paper on that? Well, let's look at the distribution of plant families. Many have a fairly widespread occurrence. The two families that I could find that strike me immediately as being distinctly Australasian are the Eupomatiaceae and the Xanthorrhoeaceae. Both of these are found east of the Wallace line — Eupomatiaceae is found in Australia and Niugini and the Xanthorrhoeaceae is also in New Caledonia. Pittosporaceae, Casuarinaceae, Epacridaceae, Stackhousiaceae, Stylidiaceae and Goodeniaceae are the only families that I would find in Beadle, Evans and Carolin (1986) and White (1986) that are primarily Australasian. One of the most noticeable things about plant families is their wide distribution, although again, tectonics have played a role here. Gondwana, the ancient supercontinent that consisted of Australia and Niugini, Antarctica, New Zealand, Africa, South America and India, as well as all of the islands in between, broke up about 100 to 130 million years ago — about the time the first flowering plants were beginning to appear. Supposedly the main plant families would have had their ancestral forms in this period, so becoming distributed over a continuous land surface would not have been difficult. Remnants of the ancient Gondwanan distribution of plant families are evident in the Proteaceae, Mimosaceae and the families mentioned earlier.

When we consider genera though, the list is expanded enormously. That most Australian of genera, *Eucalyptus,* is found exclusively east of the Wallace line. Myrtaceae (the family to which it belongs) is however a very widespread family. More Gondwanan than Australasian links are evident within the Australian Flora, so maybe we should consider that argument also.

ORCHIDACEOUSLY
(I don't know if that is a word — oh well, it is now!):

The orchids are the main reason we are having this argument, so I think that is is best if I maybe conclude my argument with their side.

Orchid seeds, as many of us know, are extremely small and are that way primarily because that permits long distance distribution by winds and air currents. The small size also allows for the production of enormous numbers of them. But certain other points do have to be taken into consideration. The plainest fact is that they are reliant upon the symbiotic fungus for their survival. Thankfully, though, fungi rely upon the same method of distribution. Should the seed and the spore be released together, then they may land in the same region as each other. Undoubtedly, too, this is a repeated occurrence, so it may happen that the fungus is installed into the area and colonises it, making the situation just right for any later arriving orchid seeds.

Many of the genera that we are concerned with in A.N.O.S. at the present will not change, it is mainly a handful of species with which we are interested. In another 2000 years or so the situation will have changed still further. The westerly breezes that are carrying the seeds through the Indonesian Archipelago will continue to do so and eventually other species will come to be known as Australasian.

I leave the decision up to you. I have not myself come to a decision. It would be nice to include the species in the Moluccas and Sulawesi, but why is it we want to delimit the boundary? What is unsatisfactory about it at the present? The decision, thankfully, is yours.

REFERENCES

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Rentoul J. N. (1982) Growing Orchids, Book Three, Vandas, Dendrobiums and Others. Lothian, Sydney.

Rentoul J. N. (1985) Growing Orchids, Book Four, The Australasian Families. Lothian, Sydney.

White M. E. (1986) The Greening of Gondwana. Reed, Sydney.

LETTER TO THE EDITOR

Editor,

Apart from an item reporting a vote at A.N.O.S. Port Hacking Group regarding members reactions, we have seen nothing, so far, in *The Orchadian* in reference to Warringah Group's submission to the Advisory Committee Meeting in 1991 that the definition of "Australasia" in the A.N.O.S. Rules be extended to include areas east of Wallace's Line.

I have heard desultory verbal argument for and against the submission and in favour of reduction of the area covered by the definition and my impression is that the reasons for increasing or reducing the area can be summarised as follows:–

FOR INCREASE

1. the proposed enlarged area is considered a biogeographical unit, with the Line a boundary between the Australian and Oriental realms.
2. There are great affinities between orchids across the current boundary.
3. The proposed area to be included has many interesting orchids which have been hybridised with Australasian orchids (current definition).

FOR REDUCTION

4. Our objectives as listed in the A.N.O.S. Rules enjoin us to promote and preserve our native orchids in their natural habitat and this is difficult enough without taking responsibility for an additional area in a foreign country where we have no lines of communciation to government.
5. Australasian means Australia and New Zealand; Papua-New Guinea and West Irian were only included because P-NG at the time A.N.O.S. was founded, was Australian territory. West Irian was Dutch administered and could easily be differentiated from Indonesian territory.
6. Judges at shows would not have to face difficulties with an increased and possibly contentious list of eligible plants.
7. Following reduction of area the reliable checklists of Australian and New Zealand orchids need only be used.

I have no problems with (1); as far as (2) is concerned this would be the case whether the boundary is drawn at the Makassar, Molucca or Torres Straits. No. 3 has a hint of commercial interest. No. 4 no argument but it is really a case for the status quo. No. 5 this is one only of many definitions of "Australasia". Nos. 6 and 7 no comment.

As there is little chance that a full debate on this subject could take place in *The Orchadian* within the time frame suggested by the Advisory

(Continued on page 385)

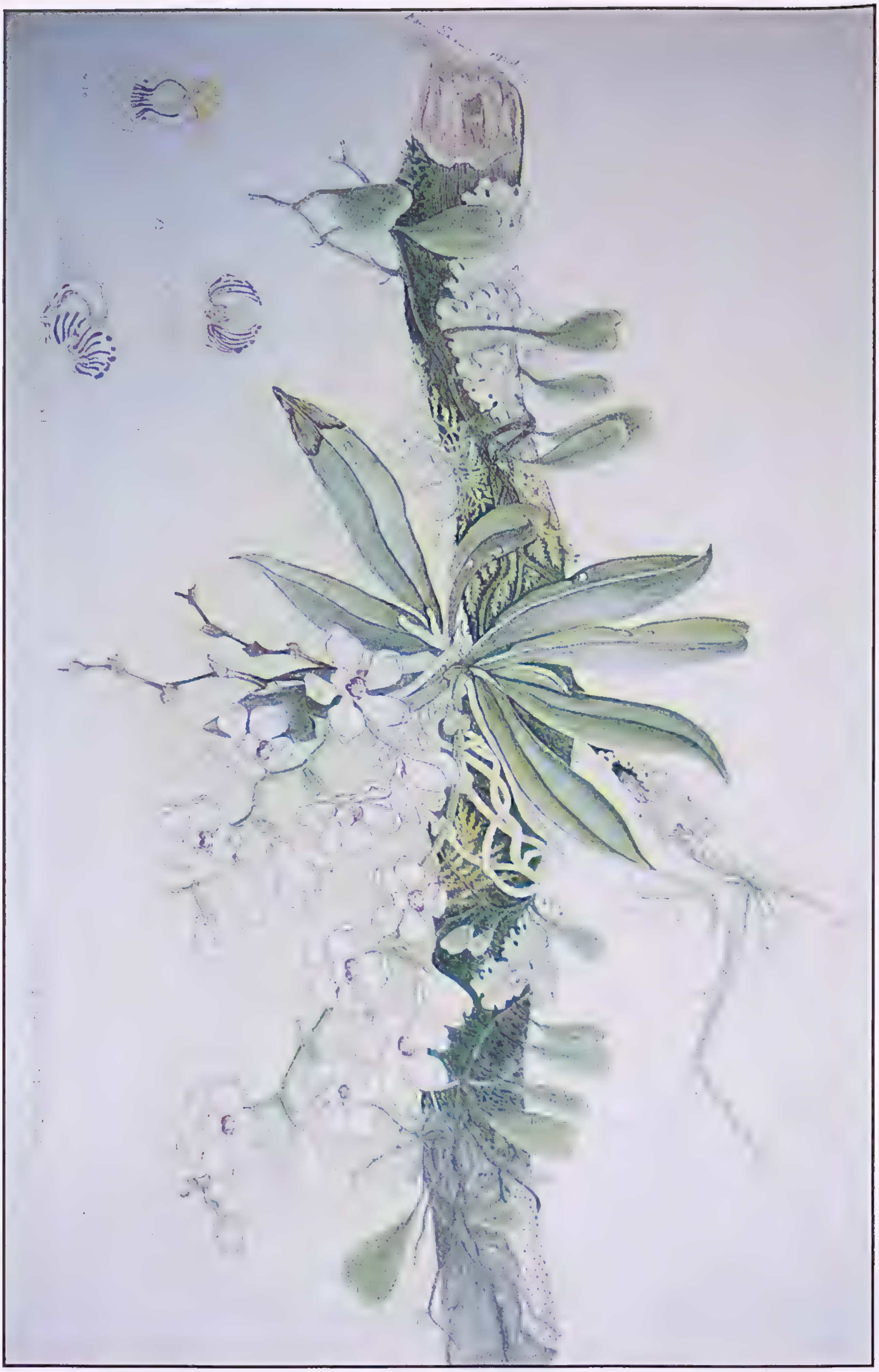


Plate 25: *Sarcochilus falcatus* R. Br. from a painting by Mair Swann.

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 6: *Sarcochilus falcatus* R.Br.

Common Name:	Orange Blossom Orchid
Subfamily:	Epidendroideae
Tribe:	Vandeae
Subtribe:	Sarcanthinae
Genus:	*Sarcochilus* R.Br.

Distribution: *Sarcochilus* is a genus restricted to Australia, New Guinea and some of the Pacific Islands. *Sarcochilus falcatus* is restricted to the coastal strip and adjacent highlands of eastern Australia, from eastern Victoria to at least the Bloomfield River on Cape York Peninsular. In the southern end of its range, *S. falcatus* is found from the lowlands to the adjacent mountains, but in its northern range, it occurs only in the mountains.

Notes: All *Sarcochilus* are epiphytes or lithophytes. the stems are relatively short and covered with persistent leaf bases. *Sarcochilus falcatus* occurs mainly as an epiphyte, but in very humid, moist environments, can sometimes be found growing amongst mosses on rocks. It is a plant of moist habitats, such as along watercourses and on trees on the crests of ridges which are frequently bathed in clouds, fogs, or misty rain. It prefers areas of subdued light, but with good air movement. The stems of *S. falcatus* can be up to 10cm long and carry three to eight, rather thin, pale green, curved or sickle-shaped leaves. The racemes arise from the axils of the older leaves or leaf bases and carry three to twelve glistening white flowers, 1.5cm to 4.0cm in diameter. The petals and sepals are of nearly equal size and pure white in colour. The labellum is fleshy and tri-lobed in shape with the side lobes curved upwards around the column. It is basically white in colour, variously marked with red, purple, yellow or orange striations on the inside of the side lobes. The flowers are blessed with strong perfume reminiscent of orange blossom, from which it has gained its common name. The flowering season is from August to October.

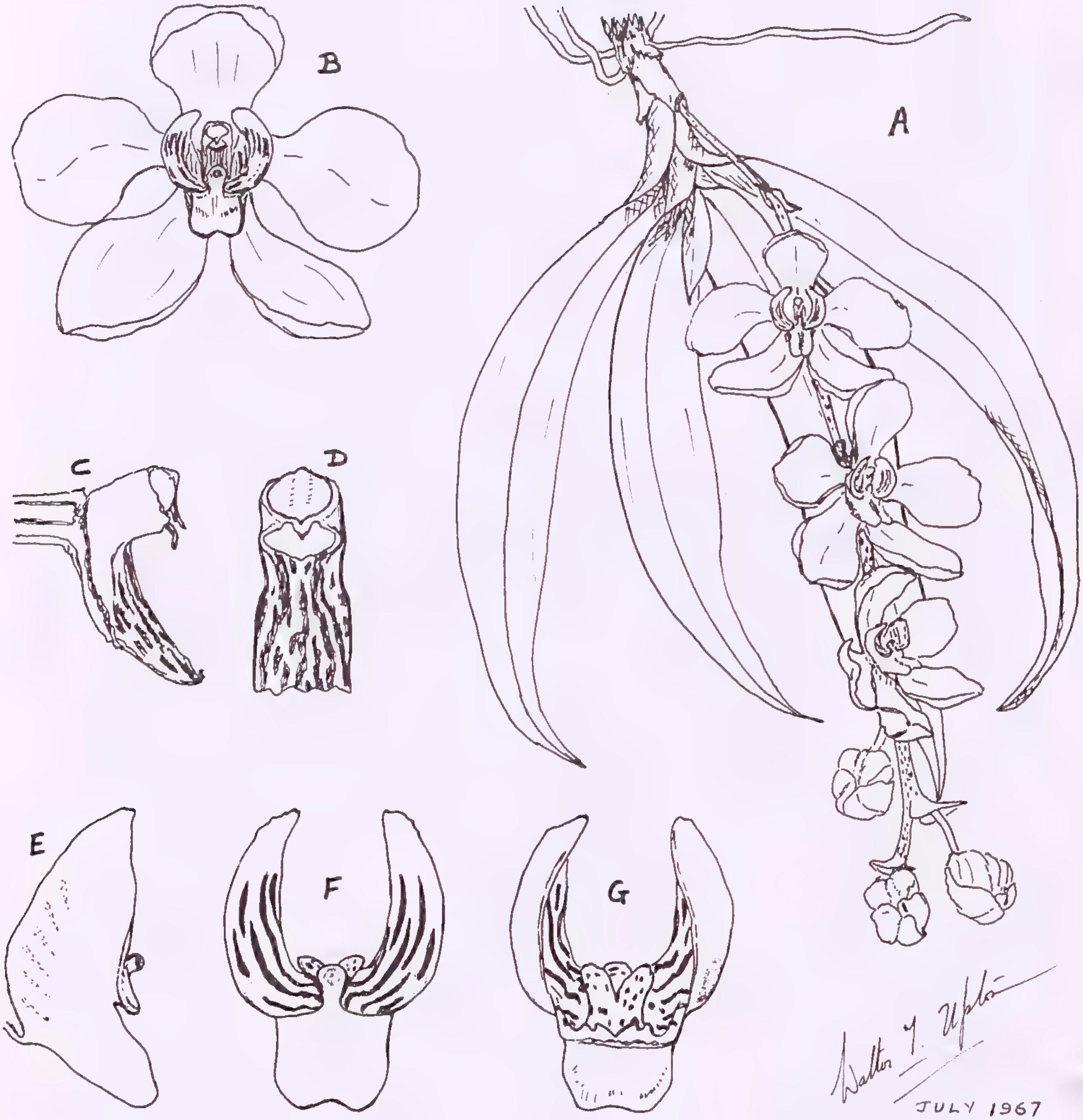
Pollination: There is no recorded pollinator of this species.

Conservation status: This species, once very common throughout its range, is now depleted in numbers by over-collecting by orchid enthusiasts and destruction of its native habitats. However, it is not considered endangered, although in some locations it is now quite rare.

Culture: *Sarcochilus falcatus* grows best by slab culture, mounted on any long-lasting material such as weathered hardwood, citrus, *Callistemon* and *Melaleuca* poles. It requires a cool, humid environment with good air movement. Regular watering and feeding with very weak liquid fertilisers are beneficial during the spring flowering and summer growing seasons.

Illustration: The painting is of a well developed plant of *Sarcochilus falcatus* as frequently found in its native habitat, clinging ephiphytically to a moss-covered limb.

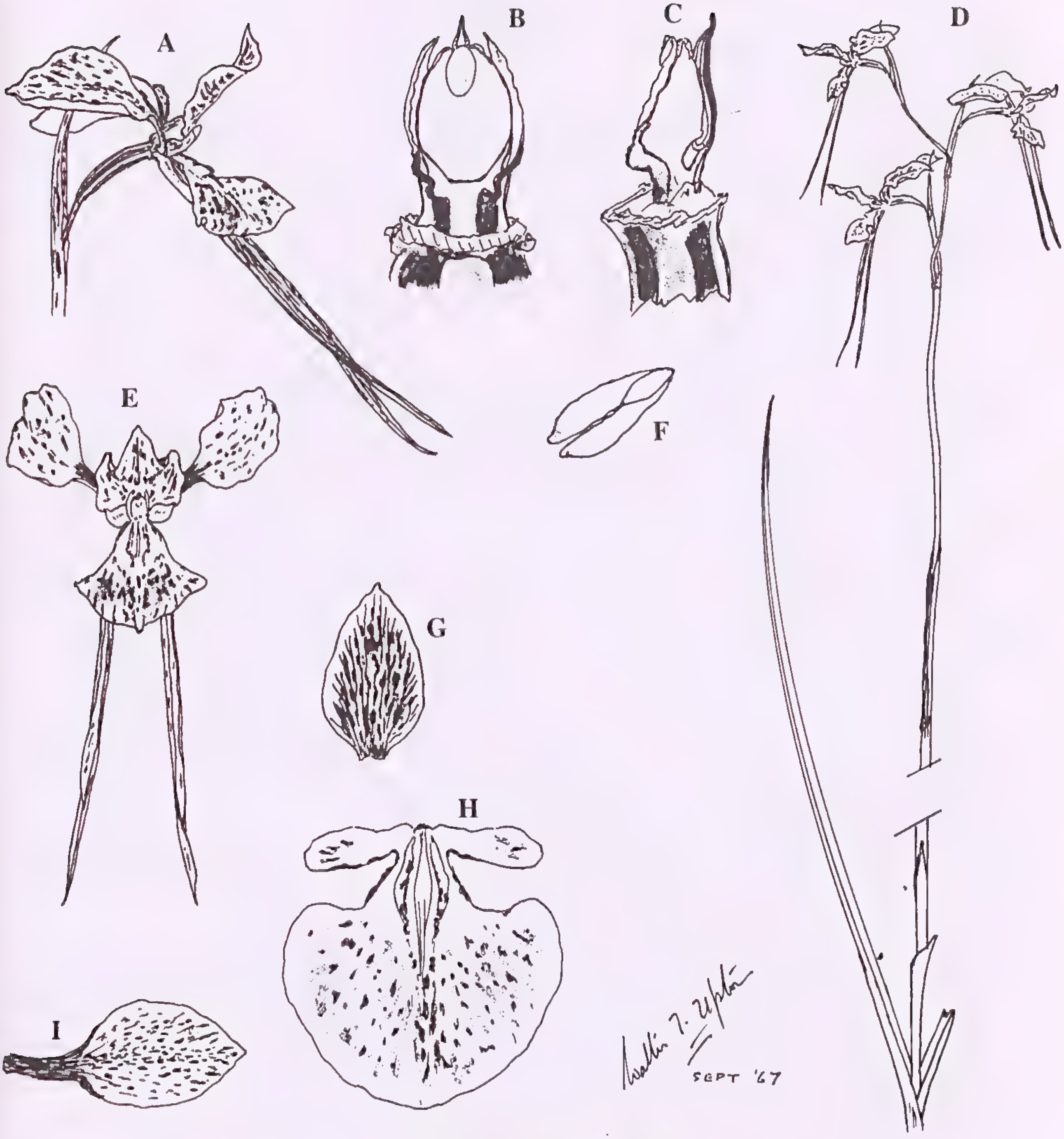
Description: By Noel Grundon, Toowoomba, Queensland.
Painting: By Mair Swann, Atherton, Queensland.
Line Drawing: By Walter T. Upton, West Gosford, New South Wales.



Sarcochilus falcatus **R.Br.**

From near Gloucester, N.S.W.

A – Plant 1X
B – Flower, front view 2X
C – Column, side view 4X
D – Column, front view 4X
E – Labellum, side view 4X
F – Labellum, front view 4X
G – Labellum, rear view 4X
from a line drawing by Walter T. Upton



***Diuris punctata* Smith**

From near Windsor, N.S.W.

A – Flower, side view 1X
B – Column, front view 4X
C – Column, side view 4X
D – Plant, ⅓X
E – Flower, front view 1X
F – Pollinarium, greatly enlarged
G – dorsal sepal, pressed flat 1X
H – Labellum, pressed flat 2X
I – Petal, pressed flat 1X
from a line drawing by Walter T. Upton

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 7: *Diuris punctata* Smith

Common Name:	Purple donkey orchid
Subfamily:	Orchidoideae
Tribe:	Diurideae
Subtribe:	Diuridinae
Genus:	*Diuris* J. E. Smith

Distribution: The genus *Diuris* occurs mainly in Australia with one species found in Timor. *D. punctata* is found from north Queensland to Victoria and has been recorded in South Australia.

Notes: All *Diuris* are terrestrial orchids and are considered to be amongst Australia's most colourful and attractive terrestrial orchids. The flowers of *Diuris* are easily distinguished by the filiform lateral sepals and the clawed lateral petals, which combined give these flowers their distinctive shape. The common name for this genus of double-tails, arises from their long, filiform lateral sepals. *Diuris punctata* is a very showy orchid with large flowers which are lilac or purple. Individual flowers can be up to 50mm across and the lateral sepals can be up to 90mm long. There are usually between two and ten flowers on a raceme or flowering stem.

Pollination: There is no recorded pollinator for this species. A few species of *Diuris* are reported to mimic pea flowers and are pollinated by small native bees.

Conservation status: This species is not considered to be under threat, although it is now far less common than in the past and Bates and Weber (1990) reported that it has not been seen in South Australia this century.

Culture: *D. punctata* can be cultivated under 25% shade in a basic terrestrial orchid mix. It can be propagated in cultivation either by seed or tuberoid removal.

Illustration: Painting; Illustrated are three flowering stems of *D. punctata,* each with a number of flowers. Line drawings: a) and d) front and side view of the flower, note the obvious claws on the lateral petals and the long filiform lateral sepals; b) and c) front and side view of the column, note the large stigma with its obvious viscidium and the lateral staminodes; g), i) and h) flattened views of the dorsal sepal, lateral petal and labellum; f) the pollinarium.

Description: Tony Slater, 159a Raleigh Street, Thornbury, Victoria 3071.
Illustration: Louise Saunders, P.O. Box 466, Benalla, Victoria 3672.
Line Drawings: Walter T. Upton, P.O. Box 215, West Gosford, N.S.W. 2250.

Reference:

Bates, R. J. and Weber, J. Z. (1990) Orchids of South Australia. Government Printer. South Australia.

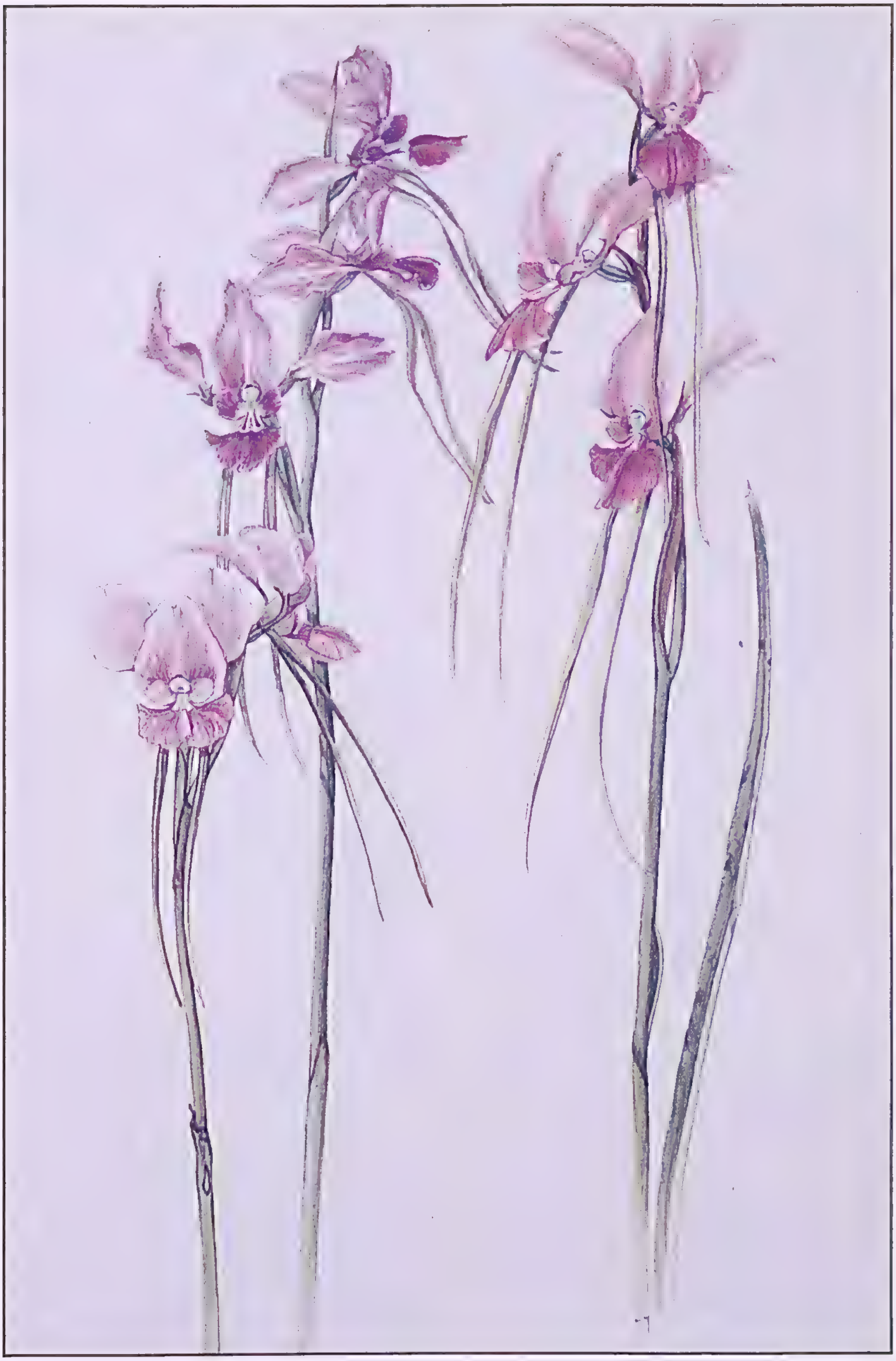


Plate 26: *Diuris punctata* Smith from a painting by Louise Saunders.

EXTENSION TO THE DISTRIBUTION OF *BULBOPHYLLUM WEINTHALII* & *DENDROBIUM LINGUIFORME* VAR. *NUGENTII*

Gerry Walsh,
7 Leslie Court,
Werrington, N.S.W. 2747

Bulbophyllum weinthalii (Rogers)

Bulbophyllum weinthalii was first described by Richard Sanders Rogers in the "Transactions Of The Royal Society of South Australia" in 1933. Within the genus *Bulbophyllum*, it is the only member of its section.

The distribution of *B. weinthalii* was previously accepted as being from Toowoomba in south-eastern Queensland to the Dorrigo Plateau in north-eastern New South Wales (Dockrill, 1969). In his book "Native Orchids of Australia", David Jones erroneously gives the distribution of *B. weinthalii* as being from "Toowoomba to the McPherson Ranges". This is obviously an accidental oversight because the type material for the species was obtained from Dorrigo, 220 kms to the south of the McPherson Ranges.

B. weinthalii is virtually confined to the Hoop Pine *(Araucaria cunninghamii)* for a host although in 1983 I observed a single clump growing on rock at Lanes Lookout on the Dorrigo escarpment. This rock was nonetheless situated under a small stand of mature Hoop Pines.

During September 1992, Mr Denis Johnson and myself visited State Forest Number 316 which straddles the Calliope and Dawes Ranges, approximately 60 kms west of Gladstone in central coastal Queensland. On the morning of Monday, Septem-ber 7, we descended into a steep, dry valley below the north-east facing escarpment. There were many huge, unlogged Hoop Pines in the locality. On the fallen branches of the Hoop Pines we were amazed to discover large quantities of *B. weinthalii*.

Several of these orchid plants displayed healthy seed pods. In the main, the numerous plants observed were quite robust. Other orchid species growing in the Hoop Pines were *Dendrobium speciosum* variety *grandiflorum, D. linguiforme* variety *nugentii, D. gracilicaule, D. teretifolium* variety *aureum* and *Sarcochilus falcatus*.

On the morning of Wednesday, September 9, we descended into the headwaters of Dry Creek, which flows south-west into the Fitzroy Drainage System. This valley supports very extensive, almost pure stands of Hoop Pines. We immediately encountered many fine clumps of *Bulbophyllum weinthalii* on the numerous fallen Hoop Pine limbs. Other orchids present included *Dendrobium linguiforme* variety *nugentii, D. gracilicaule, D. teretifolium* variety unknown (it certainly was not variety *aureum*) and *Sarcochilus falcatus*. There were no *Dendrobium speciosum* on the Hoop Pines in this spot.

This second location for *B. weinthalii* was considerably drier than was the first. In both instances the altitude was approximatley 700 metres. Seed pods were found on the *B. weinthalii* plants at the second location as well.

Our observations suggest that *B. weinthalii* is a very common orchid species on the Hoop Pines of the region. Our discovery effectively extends the distribution of *B. weinthalii* some 400 kms beyond its formerly accepted northern limits.

Between the Calliope and Dawes Ranges and the Toowoomba district, there does not appear to be much suitable habitat for *B. weinthalii*. It is reasonable to assume that our new colonies have evolved in isolation for many thousands of years. For this reason, I eagerly await the next flowering season (autumn 1993). Perhaps its isolation has caused it to be "different" from its southern relatives. Only time can tell.

Dendrobium linguiforme (Swarts) variety **nugentii** (Bailey)

It was only when I was writing up the preceding notes on *Bulbophyllum weinthalii* and relating the other orchids growing with it, that I started wondering about the southern distribution of *Dendrobium linguiforme* variety *nugentii*.

We had found this tropical variety of the tongue or thumbnail orchid, as it is commonly known, to be quite abundant about the mountains west of Gladstone. It was definitely more common on the harsh, hot, exposed rocky outcrops where it often grew into clumps of several square metres. It was nonetheless often seen in the Hoop Pine forests in the shade.

According to the tree texts I have consulted, the distribution of *D. linguiforme* variety *nugentii* was recorded as follows: Dockrill (1969) Eungella (Mackay); Jones (1988) Eungella (Mackay); Upton (1989) south of Townsville (20 deg. latitude).

In the absence of any other recorded sightings to the contrary, I have every confidence in reporting an extension to the range of *D. linguiforme* variety *nugentii* of approximately 400 kms south of its previously accepted southern limits. It is unlikely that specimens of this species would be found in the very dry country between the Calliope Ranges and the Mackay region.

At the time of our visit, the plants of the Calliope Range were in early bud. At the time of writing they have not yet flowered. Because of their probable isolation there is a slim chance that they may be different in some slight way. It is my intention to lodge specimens with the Herbarium for a scientific opinion once the flowers open. There is no doubt in my mind, however, that the plants are obviously examples of *D. linguiforme* variety *nugentii*.

Plate 28: Shows plants of *Bulbophyllum weinthalii* and *Dendrobium linguiforme* variety *nugentii* growing together on the Hoop Pine.

THE 29TH ANNUAL GENERAL MEETING OF A.N.O.S. INC. HELD AT THE GOSFORD R.S.L. CLUB ON 8TH AUGUST, 1992

Walter T. Upton

Delegates and members from eight A.N.O.S. groups and one associated society attended the 29th A.G.M. hosted by the Central Coast Group. Group attendance details are Central Coast 15, Warringah 5, Hawkesbury 2, Newcastle 2, Port Hacking 2, Sydney 2, Macarthur 1, Victoria 1. It is a great pity that delegates from other groups were not present.

The meeting was a happy occasion. The Treasureer reported A.N.O.S. is in a financially sound position, as will be seen from the Statement of Assets and Liabilities and the Statement of Receipts and Expenditure for the year ended 30th June, 1992.

Conservation Officer, Alan Dash, reported on the various local issues embraced by some groups and how A.N.O.S. was striving to gain more recognition among the widely known and more powerful conservation movements. Alan feels "that the seed has been sown for constructive policy development and activities in the year to come".

In *The Orchadian* report I advised we would bring our journal up to date with the Spring issue and we did. The Summer issue due in the first week in December, should also be posted on time. I paid tribute to our retiring editor, Noel Grundon, for the work over the years and for the many improvements he has made to *The Orchadian* and moved that he be granted Life Membership of A.N.O.S. Inc., this was seconded by Michael Harrison and carried unanimously.

Election of Office-Bearers was conducted by Bob Lowe:–

President – Barry Collins
Vice-President – Michael Harrison
Hon. Secretary – Ken Organ
Hon. Treasurer – Bob Napier
Editor – Walter T. Upton
Councillors – Steve Deards
– George Hillman
– Janet Napier
– John Riley
– Gary Sweikert
– John Turner
– Ron Wheeldon

At the Advisory Committee Meeting in the afternoon, the subject of "The Wallace Line motion" moved at last year's A.G.M. was briefly discussed. As the debate on the subject had not occurred in *The Orchadian* as previously requested of members and groups, it was moved that the question should be placed on the 1993 A.G.M. agenda. Members are encouraged to submit their views to *The Orchadian* so that a determination can be made.

Michael Harrison spoke on Council's image in some other states. Discussion generally agreed that there was a communication problem and it would be possible to address this and other difficulties by structural changes. It was moved that Council consider looking at A.N.O.S. structure and the desirability of a set-up following the lines of A.O.C. — carried.

Plate 29: The executive taken on the evening of the A.G.M. at the home of John Turner. From the left: Honorary Treasurer, Bob Napier; President, Barry Collins and Honorary Secretary Ken Organ.

Letter to the Editor from page 377

Committee in their last meeting in August, Council should consider holding a survey of members, the survey to form part of the 1993/94 Renewal Notice to gauge members' views by the next A.G.M. in August, 1993.

At 30th June, 1992, there was a total of 819 A.N.O.S. members (Ordinary, Life, Group and Family) and by our Rules a quorum, at a Special General Meeting to amend our Rules, is 20 members of whom three-quarters must vote for a motion for it to succeed; 15 members for a total of 819 — under 2%!!!

Therefore I submit that Council should get some indication of our members' attitudes before taking any action in this matter and that the survey should canvass whether members are for extension, reduction, status quo or don't know or care.

In conclusion, we have many members interested in orchids outside Australia and New Zealand but within the currently defined area and who would be disappointed if Council even considered a re-definition as outlined in (5) — it seems like changing the rules after kick-off.

Yours faithfully,
R. G. Napier,
12 Laguna Street,
Caringbah, N.S.W. 2229

AUSTRALASIAN NATIVE ORCHID SOCIETY INC.

Statement of Receipts and Expenditure for year ending 30/6/1992

RECEIPTS	$
The Orchadian – Subscriptions	17,373.00
– Colour Fund	834.00
– Sales of Back Issues	840.00
– Advertising	605.00
Conservation – Badge Sales	1,084.50
– Tuber Bank	277.50
1st ANOS Conference – Badge Sales	93.00
– Proceedings Sales	501.25
– J. Riley Cover Raffle	515.00
Group Member Fees	168.00
Family Member Fees	12.00
Bank Interest	481.16
Refund of Withholding Tax	83.95
Sales – ANOS Badges	640.00
– ANOS Medallions	435.00
– Hybrid List	18.50
– Vic. Culture Book	41.00
– W.A. Culture Book	6.00
– J. Riley Prints	95.00
Exchange Cheques	239.00
Stationery and Photocopying	31.40
Donations	146.00
Judging Panel Donations	157.00
Postage	155.33
	24,832.59
Unpresented Cheques 1991-92	3,850.39
Opening Cash in Bank 1-7-1991	11,885.55
	$40,568.53

EXPENDITURE	$
The Orchadian – Refund Subscriptions	194.00
– Colour Separations	4,273.00
– Printing	8,688.00
– Postage	2,804.54
– Editorial Expenses	794.28
Conservation – Expenses	28.36
2nd ANOS Conference – Sponsorship	1,000.00
Purchase of Equipment (Sealing Machine)	216.00
Payment for Goods, J. Greeggan	40.00
Refund Group Member Fees (ANOS Wide Bay)	46.00
Affiliation Fees – Orchid Society of NSW	30.00
Bank Charges and Credit Card Fees	308.37
Public Liability Insurance	210.41
Incorporation Expenses	20.00
Purchase of ANOS Medallions	593.00
Payment for J. Riley Prints	100.00
Rent	240.00
Secretary's Expenses	250.00
Investment in F.T.D.	3,000.00
Exchange Cheques	239.00
Stationery and Photocopying	967.50
Donations	145.00
Judging Panel Expenses	216.25
Postage	1,470.17
	25,873.88
Unpresented Cheques 1990-91	2,554.00
Closing Cash in Bank 30-6-1992	12,140.65
	$40,568.53

AUSTRALASIAN NATIVE ORCHID SOCIETY INC.

Statement of Assets and Liabilities as at 30/6/1992

ASSETS		
Cash on hand	NIL	
Cash in Bank	12,140.65	
Term Deposits	6,364.25	
		18,504.90
Stock – Books	230.00	
– *The Orchadian* Back Copies	1,095.50	
– Badges, various	3,594.50	
– Medallions	460.00	
– Proceedings	1,628.90	
		7,008.90
Equipment – Heat sealer		216.00
Sundry Debtor (ANOS Victoria)		250.00
		$25,979.80

LIABILITIES		
Subscriptions in advance	6,861.00	
Unpresented Cheques	3,850.39	
		10,711.39
Provision for The Orchadian Vol. 10, No. 8		3,500.00
		$14,211.39

Plate 27: R. D. Fitzgerald Trophy.

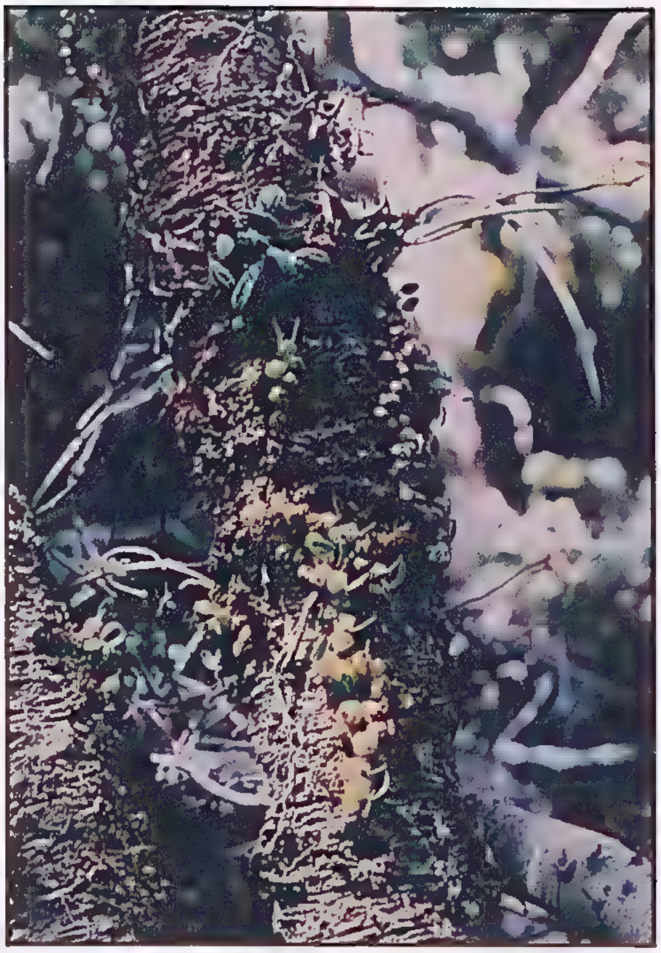


Plate 28: *Dendrobium linguiforme* var. *nugentii* above and *Bulbophyllum weinthalii*.
Photo: G. Walsh.

Plate 29: From left: Bob Napier, Hon. Treasurer; Barry Collins, President and Ken Organ, Hon. Secretary.

ROBERT D. FITZGERALD — 1830–1892 AN EARLY NATIVE ORCHID ENTHUSIAST

Ruth Rudkin,
18 Lyle Avenue, Lindfield, N.S.W. 2070

On the front cover of recent issues of *The Orchadian* are some of the beautiful illustrations from R. D. FitzGerald's "Australian Orchids". There have been *Bulbophyllum longiflorum, Phaius tankervilleae, Dendrobium stuartii* and *D. lichenastrum.* But just who was R. D. FitzGerald?

He was born in Tralee, County Kerry, Ireland in 1830. As a boy of 15 be became interested in birds to the extent that he copied the drawings of birds from two borrowed volumes of P. J. Selby's "Illustrations of British Ornithology". The drawings were so remarkable that the owner of the books gave him the two volumes and had the copies bound and encased in a wooden box. FitzGerald went on to become a civil engineer and emigrated to Australia in 1856 to join the staff of the Surveyor-General in the N.S.W. Lands Department. His father and family followed in 1860.

In 1864 he and some friends in the Lands Department made a trip to Wallis Lake to collect bird specimens. They had a small dinghy, saw very few birds but on their first landing were amazed to see enormous clumps of "rock lilies". Their curiosity aroused, they looked more carefully at the plants around them and found a number of other orchid species. Some of these they collected and with the assistance of two aborigines, they later managed to collect a clump of the *Dendrobium speciosum.* This plant was established in his home in Balmain then went with him when he moved to Hunter's Hill. Thus began FitzGerald's interest in orchids.

With study and observation his knowledge of orchids grew. This was a time when wealthy amateurs were collecting orchids and collectors from all over the world sent specimens to botanists like John Lindley, Charles Darwin and Joseph D. Hooker. Lindley was the first to make a substantial classification of the Orchid Family, Darwin was writing his classic work "On the Fertilisation of Orchids by Insects" and Joseph Hooker had just succeeded his father at Kew. In Australia, Ferdinand von Mueller, who was a botanist, explorer, geographer and collector, had been appointed Director of the Melbourne Botanic Gardens.

FitzGerald, a surveyor and civil engineer, was also interested in geology and ornithology. In the course of his work as a surveyor he was able to collect orchids from many places in Australia and even from Lord Howe Island, where he went with Charles Moore of the Sydney Botanic Gardens. He also was able to ensure that many natural wonders such as Wentworth Falls, Elizabeth Island and parts of Katoomba, Leura and other scenic areas were preserved as public reservations.

He was a close friend of von Mueller and sent him many of his plants. Von Mueller, who described more Australian plants than any other botanist, named *Sarcochilus firzgeraldii* in honour of his friend. FitzGerald also corresponded with Charles Darwin and there are references to him in Darwin's book on orchids.

However FitzGerald was more than a collector. In his home in Hunter's Hill he built a remarkable fernery in which he also grew Australian orchids, never previously grown in an Australian city and just as he had once drawn birds, he now drew orchids in his spare time. This was a time before photography as we know it and for many years artists worked with botanists and also went with scientists on voyages of exploration. The artist Ferdinand Bauer had gone with Flinders to map the coast of Australia and his brother Franz worked at Kew for 50 years.

By 1875 the first part of FitzGerald's outstanding illustrations "Australian Orchids" was published. The drawings were monochrome lithographs made by himself on stone from his own drawings from fresh plants. With the second part, the lithographs were coloured by hand from notes he had made on the colours. In 1882 he published the first volume and dedicated it to the memory of Charles Darwin. On retiring in 1887 on a Government pension he was able to give more time and attention to completing a second volume. He had nearly finished the third volume when he died in 1892. The lithographer, A. G. Stopps who had also done some of the work was able with the assistance of Mr Henry Deane to complete the final volume. Altogether there were 200 plates completed for "Australian Orchids" and numerous other unpublished plates, as well as hundreds of coloured drawings of native flowers drawn for his own amusement. His "Australian Orchids" gained many medals in International Exhibitions around the world.

As Mr J. J. Betts says in his introduction to a reprint of FitzGerald's work "at a time when the collection of exotic orchids had burst on Europe as a new and expanding commercial enterprise . . . Robert David FitzGerald was hard at work in Hunter's Hill, Sydney, growing, studying, describing and drawing Australian orchids. This is his contribution to Australia and to the world of orchids today.

REFERENCES: Reinikka, Merle (1972) A History of the Orchid. University of Miami Press.

FitzGerald, R.D. (1978) Australian Orchids. Facsimile Reprint in 2 vols. Landsdowne Press, East Melbourne, Victoria.

Plate 27: Shows the R. D. Fitzgerald Trophy, to be awarded by the Ira Butler Trophy Committee for work with Australian native orchid species as mentioned in *The Orchadian* Vol. 10, No. 9, page 319.

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- **A.N.O.S. Mackay & District Group,** Hon. Secretary, 98 Bedford Rd, Andergrove, QLD. 4740. Tel: (079) 55-1631. Meetings 8 pm on 2nd Thursday each month, Andergrove Neighbourhood Centre, Bedford Road, Mackay.
- **A.N.O.S. Townsville Group,** Hon. Secretary, PO Box 1147, Aitkenvale, QLD. 4814. Tel: (077) 78-4311. Meetings 8 pm on 1st Tuesday each month, Townsville Orchid Society Hall, Pioneer Park, Ross River Road, Kirwan.
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- **A.N.O.S. (Qld.) – Kabi Group,** Hon. Secretary, Iona Road, Beerburrum, QLD. 4517. Tel: (074) 96-0131. Meetings 7.30 pm on 2nd Tuesday each month, Nashville State High School, Barfoot Street, Nashville.
- **Native Orchid Society of Queensland,** Hon. Secretary, PO Box 159, Broadway, QLD. 4006. Tel: (07) 264-3897. Meetings 7.30 pm on 1st Monday each month, Bread House, 49 Gregory Terrace, Brisbane.
- **Native Orchid Society of Toowoomba Inc.,** Hon. Secretary, PO Box 2141, Toowoomba, QLD. 4350. Meetings 7.30 pm on 1st Friday each month, Red Cross Hall, Hall Lane (off Neil Street), Toowoomba.

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- **A.N.O.S. Central Coast Group,** Hon. Secretary, 6 Bonnieview Street, Long Jetty, N.S.W. 2261. Tel: (043) 32-0068. Meetings on 3rd Wednesday each month, Temple Kiely Visitors Centre, Dept. of Agriculture Station, Research Road, Narara.
- **A.N.O.S. Far North Coast Group,** Hon. Secretary, PO Box 949, Ballina, N.S.W. 2478. Tel: (066) 86-6303. Meetings 7 pm on 1st Thursday each month, either Ballina or Lismore phone Hon. Secretary.
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- **West Australian Native Orchid Study & Conservation Group (Inc.),** Hon. Secretary, PO Box 323, Victoria Park, W.A. 6100. Tel: (09) 378-1278. Meetings on 3rd Wednesday each month, Kings Park Board Administration Centre Theatrette, Kings Park, West Perth.

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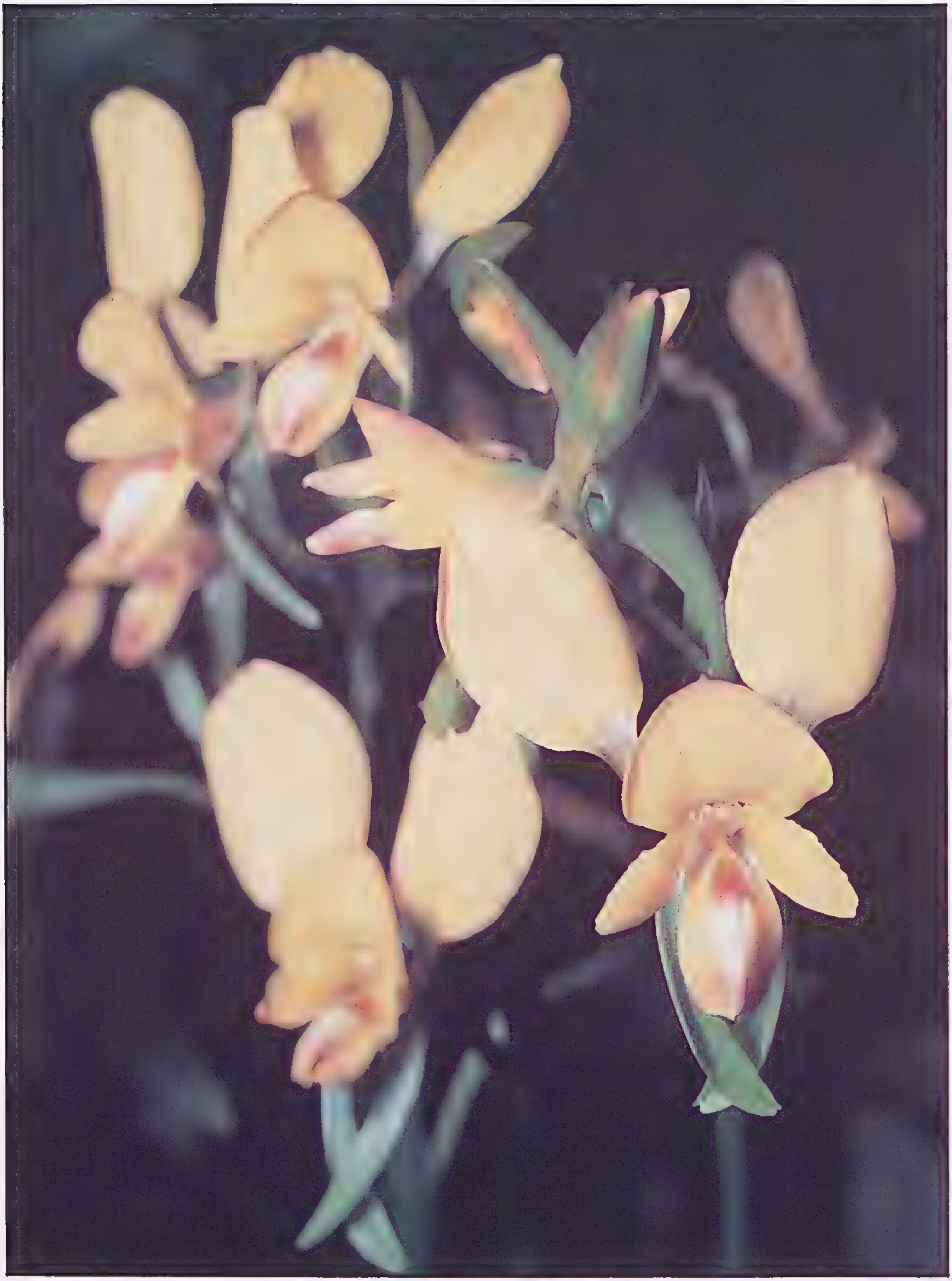
- **New Zealand Native Orchid Group,** Convenor, 22 Orchard Street, Wadestown, Wellington, N.Z.



Diuris corymbosa (yellow form) — Victoria.

Grower: R. Young

Photo: D. Titmuss

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Canterbury, N.Z.

TALKING POINT

The Australasian Native Orchid Society is as much about the social side of growing native orchids as it is the scientific. One of the aims of our society is to bring all native orchid lovers, whether they live in far north Queensland, Western Australia or Tasmania, together, at least through contact if not in person. Our medium is *The Orchadian,* tell us about your native orchids, your native orchid personalities, your club's activities; no matter how small or mundane they may seem to you, we, the members, want to know about them. Some of our members live in far away places and do not get the chance to talk to others, but they still want to know what is going on. I will start a new regular feature, "Around The Groups" if you will give me plenty of copy. Let us get closer together and enjoy our hobby, it is easy to "knock" everything, but then we do not feel good, but when we love and admire we always feel exhilarated. One of our top social events of the year is Ken Russell's Open Day at Dungog (see page 403). This year it is on Sunday, 23rd May. It is a great day from morning till night, nobody wants to leave, we all just talk and talk and then look and look and when we eventually go home, we feel relaxed and rejuvenated, all through the joy of our hobby and meeting friends.

The A.G.M. is another social occasion, but alas, too few attend. This year it is on 31st July at Gosford R.S.L. (see page 436). Would it not be wonderful if we could all get together on this occasion, then we would soon become a truly national body, we could vote in a new council from another State which could later do the rounds of all States, as the years go by.

The interest in our Society and our native orchids is gaining momentum, all groups are most enthusiastic about increased membership and keenness. Our botanists are working hard sorting out our many new species, of particular interest in this issue is Andrew Brown's article *Orchids of South-west Australia, Past to Present,* this clearly shows the difficult job our many dedicated botanists are having. The interim period may seem annoying to the horticulturalist with so many name changes, but the future looks bright. Be assured all will come out right in the end. The important point is our native orchids are being considered, they are no longer the poor relatives, they are a force to be reckoned with. Conservation must always be uppermost in our minds, our children must not be deprived of any of our species. Once a species is extinct is cannot be brought back into existence.

Our 1993 Conservation Badge should be ready for sale by the time this issue reaches you. As this is our thirtieth year the badge will be a replica of our original badge, the blue *Thelymitra ixiodes* on a white background with the dates 1963–1993.

Our native orchids are our means of bringing us all together in joy and wellbeing.

Walter T. Upton

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A NEW SPECIES OF *BULBOPHYLLUM* FROM NORTH-EASTERN NEW SOUTH WALES AND SOUTH-EASTERN QUEENSLAND

Gerry Walsh
7 Leslie Court,
Werrington, N.S.W. 2747

Bulbophyllum caldericola G. F. Walsh *spec. nov.*

Species nova affinis Bulbophyllo wadsworthii Dockrill; *a quo differt labello longiore et ad centrum valde reflexo; petalis multo latioribus; rostello maiore et truncatiore; bracteis florum brevioribus; bracteis rhizomatis laevioribus plus arcte rhizoma amplectentibus; et anthera fissa antice.*

A new species with affinities to *Bulbophyllum wadsworthii* Dockrill but differing in the following respects: labellum longer and strongly reflexed at centre; petals much wider; rostellum larger and more truncate; floral bracts shorter; rhizome bracts smoother and more tightly clasping the rhizome; and anther cleft at front.

DESCRIPTION

Plant epiphytic, occasionally lithophytic. **Clumps** small to medium consisting of short to medium length stems to 25 cm, tending upright when short, becoming pendulous with length. **Rhizomes** about 3mm thick, covered entirely with old scarious or green bracts, 2 to 3 internodes and 1.5 to 2.5 cm between pseudobulbs. **Pseudobulbs** 7-12 mm x 3-5 mm, succulent, cylindrical to ovoid, blunt or flattened. **Leaves** sessile, 25-80 mm x 5-13 mm, succulent, shape variable from linear to cymbiform, slightly tapered at base, apex acuminate, straight or gently curved, with a narrow to wide V-shaped channel along entire length. **Peduncles** usually solitary, occasionally 2 together, 5-8 mm long, singularly flowered. **Flowers** 8-10 mm long, white to pale yellow, sepals bright yellow in apical quarter, labellum orange. **Sepals** subsimilar, 6-8 mm x 2.5-3.5 mm at widest span, ovate, tapering to long, fleshy, acuminate points. **Petals** 2 mm x 3 mm, almost colourless, ovate but apex variable, more or less truncate and slightly to deeply notched or irregularly toothed, projecting downwards at about 45 deg. to the column. **Labellum** 2 mm x 0.8 mm, glabrous, erect, shallowly channelled in proximal two-thirds, then reflexed abruptly, apical third oblong, apex rounded. **Column** about 1.2 mm x 2 mm, foot projected directly ahead of ovary, 1 mm x 1.6 mm. Stelidia short, truncate at apex. Anther positioned higher than stelidia, not rostrate but cleft at front. Pollinia ovate when viewed from front.

HOLOTYPE: Latitude 28 deg. 27.5' x longitude 153 deg. 08', (Tweed Range, northern NSW), G. F. Walsh & D. Johnson, April 1986. Specimens lodged at Herbaria at the Royal Botanic Gardens in Sydney and the Australian National Botanic Gardens in Canberra, February 1993.

DISTRIBUTION: The mountains forming the border between north-eastern NSW and south-eastern Queensland (McPherson and Tweed Ranges).

NOTE: The specific epithet refers to the Latin "calderia" which means "caldera" in Spanish and English. This refers to the "Tweed Caldera" or "Tweed Volcano"; the geographical term for the mountains to which *B. caldericola* is so far believed to be restricted. *"Caldericola"* translates literally as "inhabitant of the caldera".

Bulbophyllum caldericola so far is restricted to the highest elevations (above 700 metres) of the McPherson and Tweed Ranges, on the border between south-eastern Queensland and north-eastern NSW. It grows on the trunks and major limbs of mature trees in warm-temperate rainforest. It has been reported growing lithophytically in the Queensland portion of its range.

B. caldericola, although it superficially resembles *B. shepherdii,* is in fact more closely related to *B. wadsworthii* and *B. gadgarrense,* which belong to section *Oxysepalum* of the genus *Bulbophyllum.* This section is characterised by the sympodia rooting to the host tree or rock from the base only with just an occasional root forming along the rhizome. The rhizomes of section *Oxysepalum* plants may be erect or pendulous. This is not usually the case in section *Polyblepharon,* which contains *B. shepherdii, B. macphersonii, B. sladeanum* and *B. schillerianum.* Also, the latter do not have the elongated apices to the sepals that typify *B. wadsworthii, B. gadgarrense* and *B. caldericola.*

The main ways in which *B. caldericola* differs from *B. wadsworthii* are as follows:

- Labellum is longer than *B. wadsworthii* and is strongly reflexed, or bent, at the centre. It was impossible to flatten it for drawing.

- Petals are a different shape from and much wider than *B. wadsworthii.*
- Anther of *B. caldericola* is cleft at front.
- Flower bract not as long as *B. wadsworthii* or *B. gadgarrense.*
- The rostellum is larger and more truncate than *B. wadsworthii.*
- The rhizome bracts are smoother and clasp the stem more tightly than *B. wadsworthii.*

Another important point worth mentioning is the fact that there is a distance of 1800 kms separating *B. caldericola* and the other two Australian members of section *Oxysepalum,* both of which are restricted to the highland regions of North Queensland.

DISCOVERY

B. caldericola first came to my attention in April 1986 when, in the company of Mr Denis Johnson, I visited the mountains on the NSW-Queensland border. This region is often referred to collectively as the Border Ranges, and consists primarily of the McPherson Range, the Lamington Plateau and the Tweed Range. Several small plants were retrieved from fallen trees that had been chainsawed and pushed to the road's edge.

In four distinct spots, plants were located that were initially deemed to be specimens of *B. schillerianum,* mainly because of the size of the leaves, even though the leaf shape was not representative of that species. The leaf is in fact very similar in shape to *B. shepherdii* but is up to five times the size. For these reasons, many people who have collected specimens of *B. caldericola* in the past have assumed them to be either odd plants of *B. schillerianum* or robust clones of *B. shepherdii.*

Adding to the confusion over the identity of *B. caldericola* is the extreme variability in its vegetative characteristics. I was recently shown specimens from the Qld part of its realm. These ranged from smallish pieces, very similar to *B. shepherdii* in appearance, to large-leaved, pendulous pieces, not unlike typical plants of *B. wadsworthii.* Under the mircroscope, however, each species was easily separated.

The flowers of *B. caldericola* superficially resemble *B. shepherdii,* particularly in colour, but they are roughly double the size of that species. In October 1992, a full investigation of this "strange" *Bulbophyllum* was undertaken. The differences noted supported the long-held opinion that this orchid did not agree with any other published taxon.

When in bloom, the most telling difference is in the labellum. The labellum of *B. caldericola* is quite smooth and glabrous when compared to the labellum of *B. shepherdii.* Even plants of both species collected from the same locality maintain this difference. As well, the apices of the sepals of *B. caldericola* are always much more elongated than those of *B. shepherdii.*

During subsequent trips to the Border Ranges in July 1988, November 1989 and October 1992, *B. caldericola* has always been found to be common, although localised. Nearly always the plants seen have been found on fallen trees at the edge of tracks and roads where local authorities have pushed them while clearing the way.

I have never observed *B. caldericola* flowering at any time other than October and November. It does not share the habit that *B. shepherdii* and *B. schillerianum* have of flowering occasionally at other times of the year.

CULTIVATION

In cultivation, I have found *B. caldericola* quite an easy orchid to grow. I treat it the same way as I do my plants of *B. schillerianum* and *B. shepherdii.* That is, I grow it on slabs of *Cyathea* treefern fibre for first preference, but cork, paperbark poles and hardwood palings seem to suit it equally as well. I water it the same as everything else in the bush house, which is covered with 70% shadecloth.

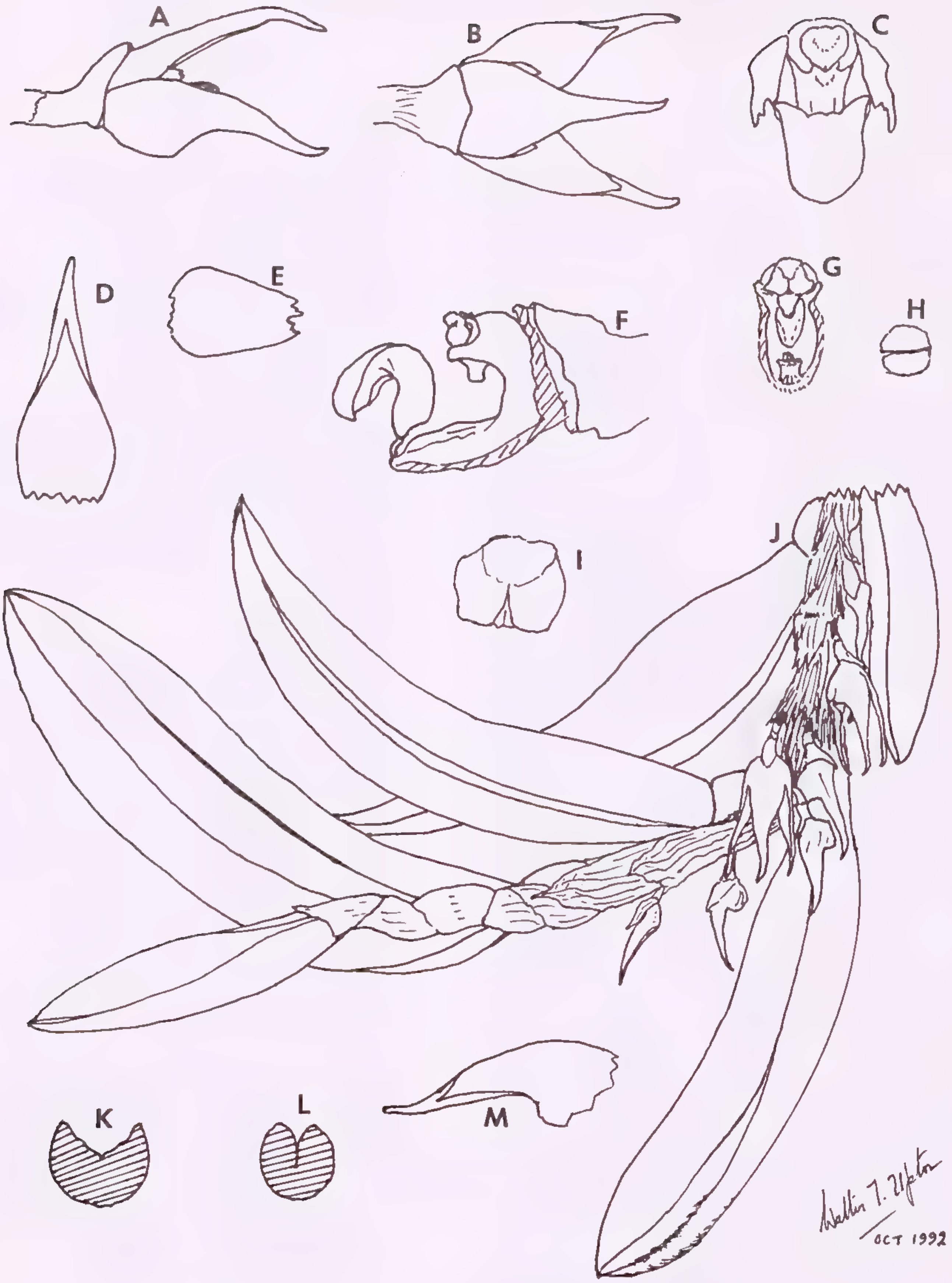
ACKNOWLEDGMENTS

I wish to gratefully acknowledge the assistance given to me by the following people: Mr W. Upton for his beautifully executed drawings, Mr J. Betts for the Latin translation and Mr T. Bishop for his photography and technical advice. As well, my sincere gratitude to Mr D. Smedley for the loan of plant material. I especially wish to thank Mr Denis Johnson who accompanied me and gave advice, support and friendship during the long field trips leading to the publication of this paper.

November, 1992.

Plate 1 shows a close-up of the Holotype for *Bulbophyllum caldericola.*

Plate 4 shows a comparison between plants of *B. caldericola* and the species most often confused with it, *B. shepherdii.*



Walter T. Upton
OCT 1992

***Bulbophyllum caldericola* G. F. Walsh**

A Flower from side	4 X
B Flower from above	4 X
C Labellum, column, petals from front	16 X
D Dorsal sepal	4 X
E Petal	8 X
F Column & labellum, side view	16 X
G Column, front view	16 X
H Pollinia	20 X
I Anther from front, above	24 X
J Plant	2 X
K & L Cross section of leaf	2 X
M Lateral sepal	4 X

STARCH GEL ELECTROPHORESIS — A TECHNIQUE USED TO IDENTIFY PUTATIVE HYBRIDS BETWEEN *DENDROBIUM STRIOLATUM* AND *D. PUGIONIFORME*

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GPO Box 1777, Canberra, A.C.T. 2601

ABSTRACT

An interspecific hybrid of *Dendrobium striolatum* and *D. pugioniforme* was identified by malate dehydrogenase (MDH) enzyme system using starch gel electrophoresis. Banding patterns produced by *D. striolatum* H. G. Reichb. and *D. pugioniforme* Cunn. were different but monomorphic and the interspecific hybrid exhibited banding patterns with alleles from both the parents, thus the hybrid genotype can be distinguished from the parental genotype.

INTRODUCTION

In recent years gel electrophoresis has been used quite extensively in providing a relatively rapid and sensitive means of detecting genetic variation in a number of plant species (Coates, 1990; Marshall and Weiss, 1982; Panetta, 1990). The utility of this technique has also been demonstrated in cultivar identification (Mielke and Wolfe, 1982; Wendel and Parks, 1983; Schwennesen et al., 1982 and Bringhurst, 1981). Preparation of gel and enzyme extraction is relatively simple and the method can be used to quickly determine and organism's genotype independent of judgement based on phenotypic information (Gottlieb, 1971).

Dendrobium striolatum R. G. Reichb. is endemic and occurs in north-eastern Tasmania, the Bass Strait Islands, eastern coast of Victoria and in the ranges in N.S.W. as far north as Gosford. It almost always grows on rocks, often forming extensive masses sometimes covering boulders and cliff faces (Jones, 1988). This species can be recognised by short, curved, terete leaves and a pale yellowish flower with a white labellum and darker stripes on the base of the segments. *D. pugioniforme* Cunn. grows on trees and boulders and occurs from the Illawarra north along the coastal ranges to south-eastern Queensland and can be easily recognised by its fleshy leaves which have a rigid, dagger like point. Naturally occurring hybrids are rare, but are easily recognised because they possess characters between the two parents.

The objective of the present investigation is to determine if starch gel electrophoresis could provide enough information to identify putative natural hybrids between *D. striolatum* and *D. pugioniforme* with the view to using the method to identify other putative hybrids between certain species of orchid.

MATERIALS AND METHODS

The plants of *D. striolatum* (CBG No. 8502395), *D. pugioniforme* (CBG No. 671561) and a hybrid (CBG No. 8805121) were grown in the glasshouse collection of the Australian National Botanic Gardens (ANBG). Close examination by the taxonomists of the taxonomic features, indicated that the plant in question was a hybrid between the two respective parents. Origin and information on locality of collection were confirmed by the ANBG computer database and are presented in Table 1.

Table I: **ORIGIN OF SPECIMENS USED IN THIS STUDY**

Accession number	Name	Locality/ origin
CBG 8502395	*D. striolatum*	central coast of N.S.W.
CBG 671561	*D. pugioniforme*	central coast of N.S.W.
CBG 8805121	*D. striolatum* X *D. pugioniforme*	central coast of N.S.W.

A small section of leaf tissue was mashed in a drop of extraction buffer (phosphate buffer, pH 6.90, dithiothreitol 1mg/ml, polyvinylpyrrolidone PVP (mol. wt. 40,000) in a 2.5ml plastic vial and the extract absorbed on to 5 x 10mm chromatography paper.

Starch gel was prepared in the following way:–

34g of starch (Sigma Cat. No. S4501) was placed in a 500ml vacuum flask.

Morpholine citrate (MC) buffer was prepared by adjusting 0.04 citric acid to pH 6.1 by the addition of N–(3–aminopropyl) morpholine.

220ml of MC buffer was boiled and rapidly mixed with the starch dissolved in 100ml of cold buffer.

A vacuum was applied to the flask until large bubbles were produced and then it was poured into a perspex mould of 215 x 123 x 10mm.

The gel was kept overnight at room temperature but was refrigerated for about 30 minutes before inserting wicks 5–7cm from the cathodal end. The electrode reservoir tray was filled with 700ml of MC buffer and sponges soaked in tray buffer were used as bridges to the gel. The gel was run for five hours at 60mA constant electric current in a refrigerator at 3–5°C. After the run gel was trimmed and cut into four slices, two of the slices were used for the present studies. After placing the slices on a polystyrene tray, a staining solution (as described below) was poured over the gel:

125ml of distilled water,
10ml of 1M tris,
10ml of 0.2M sodium malate,
20mg NAD (nicotinamide adenine dinucleotide),
5mg PMS (phenazine methosulphate),
10mg of MTT (3– [4,5–dimethylthiazol–2–yl] –2,5 – diphenyltetrazolium bromide).

The gel was then incubated at 37°C until dark bands appeared. Banding patterns were noted and the gel stored in 50% ethanol for ten days.

RESULTS AND DISCUSSION

Healthy growing leaf tissue was used and repeated sampling of these plants gave consistent results. No difference in banding patterns were observed for some of the enzyme systems such as, alcohol dehydrogenase (ADH), malic enzymes (ME) and glutamate dehydrogenase (GDH), however, it was possible to distinguish the hybrid from its respective parents by the malate dehydrogenase (MDH) enzyme system.

Specific, consistent and reproducible banding patterns were produced (Fig. 1) by *D. striolatum* and *D. pugioniforme* which were monomorphic, but the banding patterns produced by the hybrids showed a combination of a parental type possessing the fast allele from *D. striolatum* and slow allele from *D. pugioniforme* with a darker middle band (typical of hybrids). A three banded hybrid represents the enzyme MDH being dimeric, which has also been shown in other studies (Chaparro et al., 1989). There are significant reports in literature on hybrids (between species) which have been described by taxonomists based on morphological characters, but this has not been confirmed electrophoretically. To the best of our knowledge this appears to be the first report of an electrophoretically confirmed interspecific hybrid of an Australian epiphytic orchid.

Intergeneric and interspecific hybrids have been successfully differentiated by isozymic banding patterns in other studies. For example Parfitt and Arulsekar (1985) identified peach and plum hybrids, Santamour and Demuth (1980) identified pear, Carter and Brock (1980) identified peach and Torres and Bergh (1980) were successful in identification of avocado hybrids using isozyme analysis.

These results therefore provide further evidence of the significant contribution of this electrophoretic technique in the identification of hybrids and in particular its application to research in the family *Orchidaceae*.

ACKNOWLEDGEMENTS

We thank Corinna Broers and Jan Wilson for valuable technical assistance.

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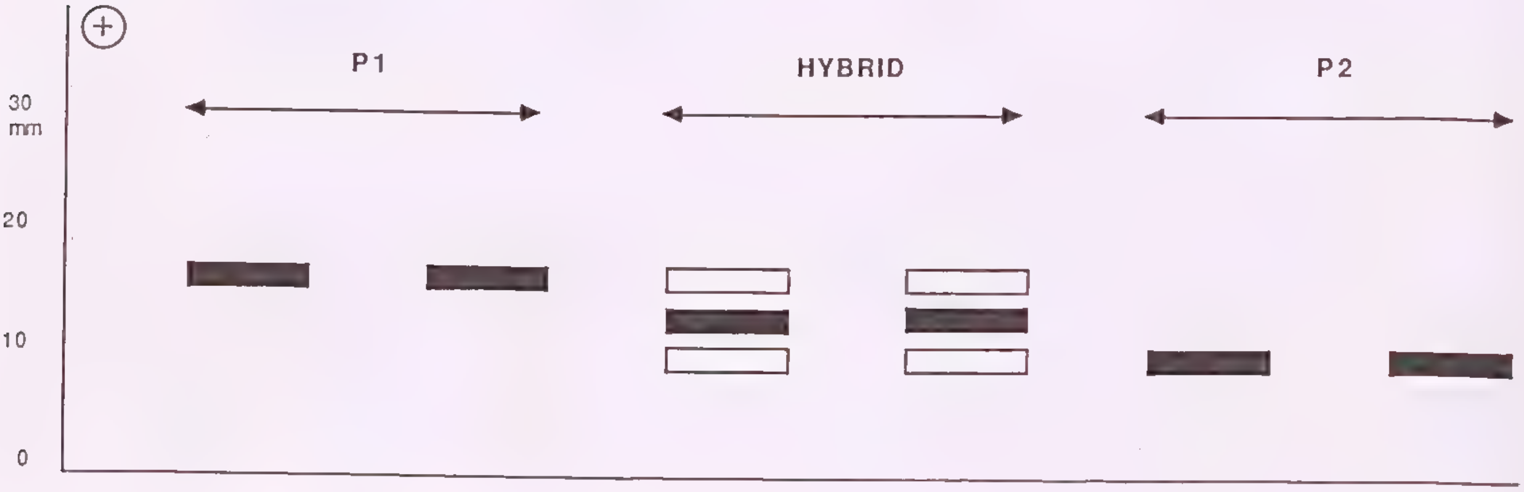
FIGURE 1

ISOZYME BANDING PATTERNS FOR MALATE DEHYDROGENASE (MDH)

Parents are P1 = *Dendrobium striolatum*, P2 = *D. pugioniforme*;
Hybrid = *Dendrobium striolatum* x *D. pugioniforme*



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SARCOCHILUS AUSTRALIS IN THE KYOGLE DISTRICT

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9 Bald Street, Norah Head 2263

In late winter of 1990, I and several friends, Len Lawler, Stewart Penman and Gordon Young, set out from Stewart's place in the Kyogle district to search through the loppings from the Hoop Pine (*Araucaria cunninghamii*) being logged nearby. Of particular interest to me were the *Sarcochilus* spp. occurring in that area. In one place the lower branch loppings had been piled up on the ground and amongst these were a number of plants, which unfortunately were rather stressed. Those which appeared to have a chance of survival were removed and kept for identification. The dominant species were *Plectorrhiza tridentata* and *Sarcochilus hillii* with a few *S. spathulatus*. Of the plants which Len and I brought back, one was morphologically different from the others. It was kept separate, mounted on a slab of treefern and hung up, hopefully, to grow on to flowering. It flowered in October of 1991.

I wrote to Len, who had returned to Atherton by this time and described the plant in general terms, noting that it closely resembled *S. australis* but there were some inconsistencies when compared with *S. australis* we had found many years ago in the Blue Mountains. The plant we had collected had fewer flowers (six) on a single raceme and were smaller and less colourful. Len replied suggesting I take it over to Wal Upton who was, at that time, finishing his book on *Sarcochilus*. Unfortunately by this time the flowers had withered and dropped, but Wal was interested nevertheless and we discussed the other possibilities after viewing some of his slides of hybrids made from *Plectorrhiza tridentata* and *Sarcochilus spathulatus*. To me there was a resemblance but it was clear we had to await another flowering. In the meantime I wrote to Stewart Penman about it who, in his reply, described plants of *S. australis* he found west of Grafton years ago and which resembled the plant I described. They too, were atypical. Stewart suggested that if this plant was a natural hybrid the most likely parents would be *Plectorrhiza tridentata* and *Sarcochilus spathulatus*.

Obligingly this year, again in October, the plant has produced a short raceme with five flowers and Wal has confirmed, after close examination, that it is in fact *S. australis*.

The finding of *S. australis* in the Kyogle district is of interest as it extends the habitat range of this delightful orchid.

Plates 2 and 3 were taken on the 9th October this year.

LETTER TO THE EDITOR

Editor,

In the recent Summer 1992-93 issue of *The Orchadian* my article on *Pterostylis tunstallii* was published; I was surprised that the slide I had given you as a frontal shot of *P. tunstallii* (Plate 8) is NOT, of course, the true *P. tunstallii,* but a close affinity. I must humbly apologies and I now enclose a slide of the species from the type site taken by Mr R. Tunstall; for publication as convenient.

The *Pterostylis longifolia/P. tunstallii* complex is still being studied and at present there are about 10 or so distinct taxon involved.

Sincerely yours,
Leo I. Cady, Kiama.

(Ed.—Plate 8 shows the true *P. tunstallii).*

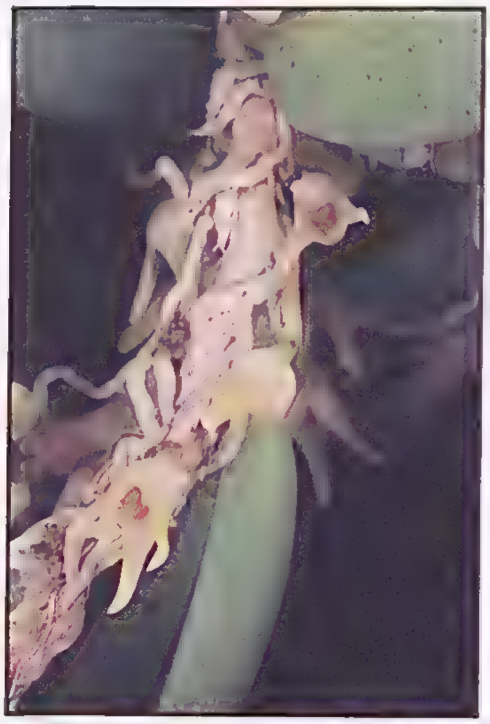


Plate 1: *Bulbophyllum caldericola.*
Photo: T. Bishop.

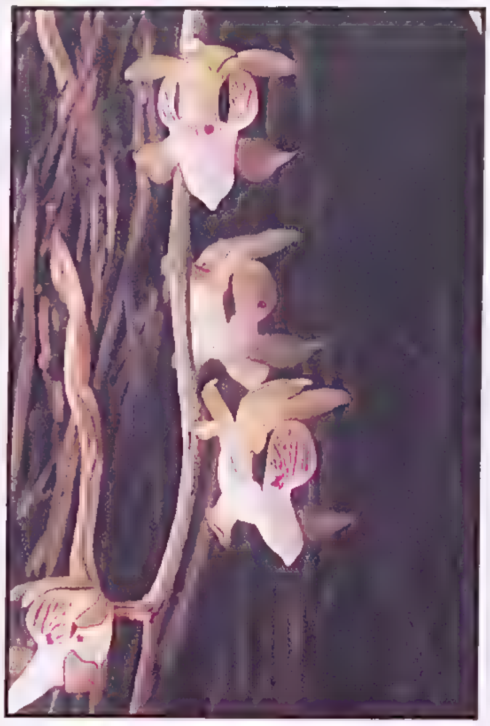


Plate 2: *Sarcochilus australis.*
Photo: W. T. Upton.

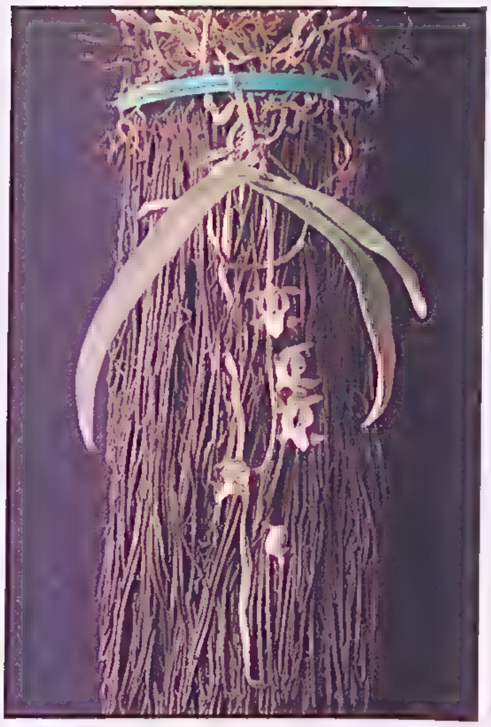


Plate 3: *Sarcochilus australis.*
Photo: W. T. Upton.

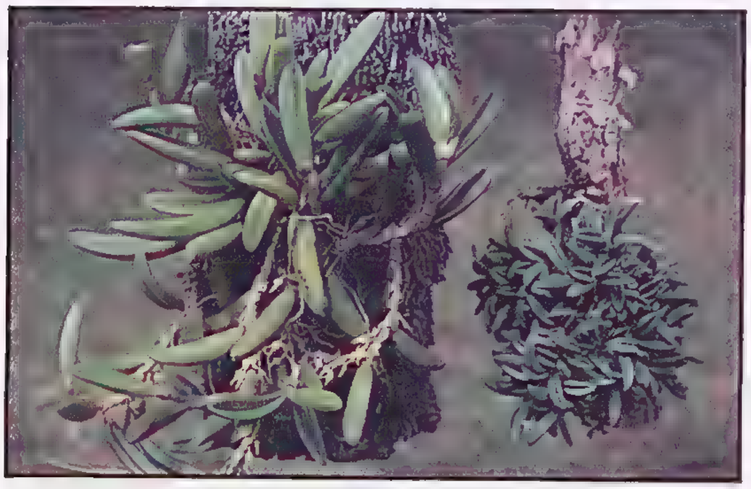


Plate 4: *Bulbophyllum caldericola* (left) and *B. shepherdii.*
Photo: T. Bishop.

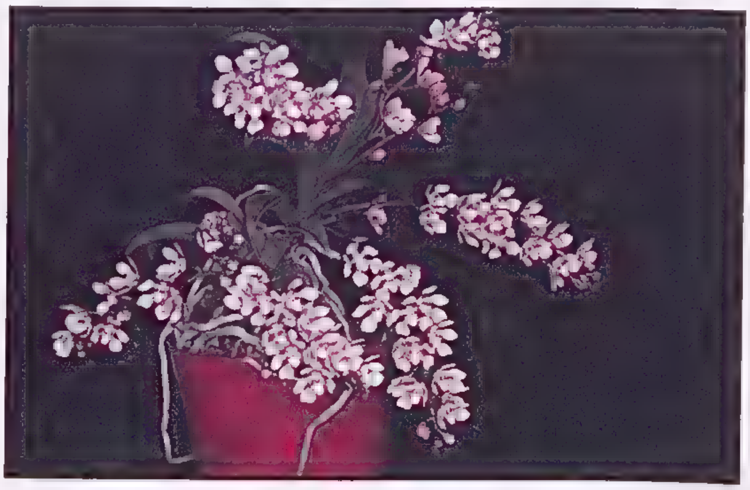


Plate 5: *Sarcochilus* Lowana. Photo: R. G. Napier.

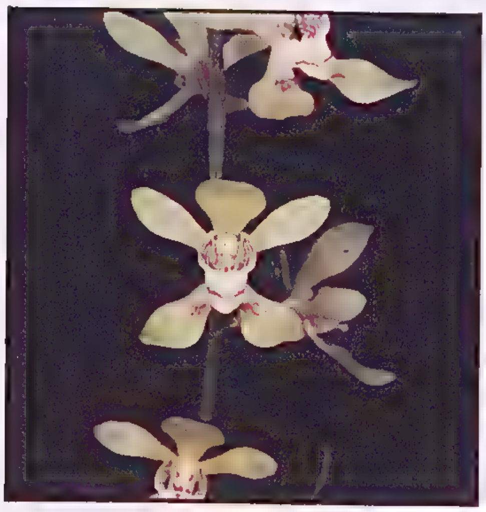


Plate 6: *Sarcochilus* Southern Cross.
Photo: R. G. Napier.

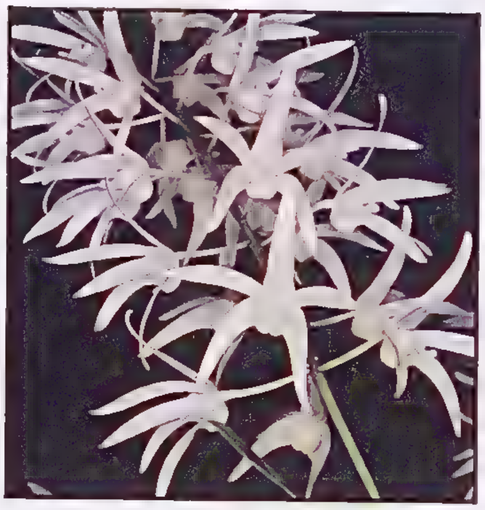


Plate 7: *Dendrobium jonesii* var. *bancroftianum.* Photo: R. G. Napier.

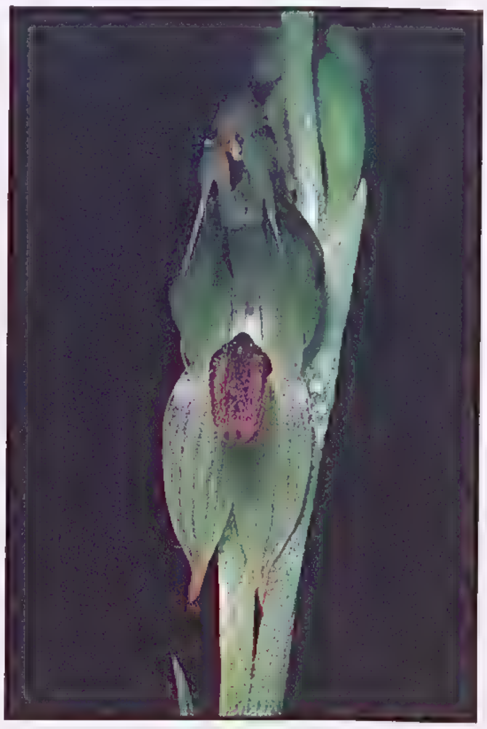


Plate 8: *Pterostylis tunstallii.*
Photo: R. Tunstall.

SHOW REPORTS

A.N.O.S. PORT HACKING GROUP 1ST ANNUAL *SARCANTHINAE* SHOW

Bob Napier,
12 Laguna Street, Caringbah 2229

Port Hacking Group held its first Annual *Sarcanthinae* Show at the South Engadine Scout Hall, Yarrawarrah on 1st November, 1992.

Weather was bad with some heavy downpours limiting attendance of visitors and making duty on the partly unsheltered sales bench uncomfortable. Lack of visitors could also be blamed on our local newspaper's omission of our show from their "What's On" column.

Some of our growers suffered from the rain preceeding the show, many blooms manifesting spotting.

The sales bench did not meet our expectations in spite of our new till, push-button operated thanks to Col Brandon, who also, as usual, installed our lighting and sorted out problems with the tea urn.

Taking all the above into consideration, the show was voted a success financially and socially, so much so, consideration is being given to increasing the duration to two days, necessitating another venue as the present hall is otherwise spoken for on Saturdays.

Under normal circumstances Steve Griffiths would have written this, but due to an unfortunate incident a few days after the show, I have had to run with the ball and rely on an increasingly unreliable memory for this report.

The winners in each class are as follows:–

Best *Sarcochilus hartmannii* — *Sarcochilus hartmannii* 'Godwin' exhibited by Neville Roper.

Best *Sarcochilus fitzgeraldii* — Exhibited by Kevin Wilson.

Best *Sarcochilus falcatus* — Exhibited by Kevin Wilson.

Best Other *Sarcanthinae* species — *Sarcochilus ceciliae* exhibited by Dennis Wood.

Best *Sarcanthinae* hybrid (*S. hartmannii* parent) — *Sarcochilus* Lowana exhibited by Dennis Wood (Plate No. 5).

Best *Sarcanthinae* hybrid (excluding *S. hartmannii* parentage) — *Sarcochilus ceciliae* X *Pteroceras hirticalcar* exhibited by Bruce Smith.

Best *Sarcanthinae* species (Seedling) — *Sarcochilus hartmannii* 'B.K. No. 1' X 'Red Snow' exhibited by Dennis Wood.

Best *Sarcanthinae* hybrid (Seedling) — *Sarcochilus* Weinhart X *S.* Pinkhart exhibited by Darryl Smedley.

Best *Dendrobium* species — *Dendrobium jonesii* var. *bancroftianum* exhibited by Col Brandon (Plate No. 7).

Best *Dendrobium* hybrid — *Dendrobium* Ella Victoria Leaney exhibited by David Curry.

Best Terrestrial Orchid — *Phaius flavus* (New Guinea) exhibited by Bob Napier.

Best Orchid not elsewhere included — *Cadetia chionantha* exhibited by Darryl Smedley.

Best Novice *Sarcanthinae* — *Sarcochilus* Southern Cross exhibited by David Curry (Plate No. 6).

Best Novice *Dendrobium* — *Dendrobium teretifolium* 'Black Pam' X *D. linguiforme* exhibited by David Curry.

Best Junior — *Sarcochilus* Pinkhart exhibited by Greg Wood. 2nd in this class was *Dendrobium* Eureka exhibited by Grant Wood.

CHAMPION OF THE SHOW — *Sarcochilus* Southern Cross exhibited by David Curry (Plate No. 6).

Well that puts Dave out of the novice classes, the *Sarcochilus* Southern Cross was exquisite and fully deserved its win, my eye was also caught by Darryl Smedley's *Cadetia*, again exquisite is the word. Col Brandon's *Dendrobium jonesii* and Neville Roper's *Sarcochilus hartmannii* also stood out.

Thanks go to all members who helped, not the least Ross Penklis on the sales, coping with the rain, Dennis Wood, Show Marshal, David Hicks and Steve Deards who amongst other duties organised the signs on the highway. We must not forget the A.N.O.S. Judges who must have travelled an aggregate 500km to judge, their contribution to our shows is, I am sure, very underated, thanks to Ron Wheeldon, Darryl Smedley, Jim Bailey, Jim Lycos, Gerry Walsh and Ken Organ.

MAKE A NOTE OF THIS DATE

Ken Russell's Dungog Open Show is on **Sunday, 23rd May, 1993.** This is No. 5 and it is going to be bigger and better than ever before. The hall is to be repainted and a new lighting system is being installed. The show is open to both members of orchid societies as well as non-members. As last year, the show will be in two parts, one, the native orchids and two, the exotic orchids; there is something for everyone. Displays of orchid photographs and a slide show; bring along your favourite slides and let others see them.

This show is a must — all the best growers exhibit and its one of the great social days on the orchid calendar. If you have been before you will remember the great time and all the friends you met from as far away as Victoria and Queensland. Plants for sale — big prizes — refreshments, Ken tells me he has already ordered the steaks.

SUNDAY, 23RD MAY, THE SHOWGROUND, ABELARD STREET, DUNGOG, N.S.W. Time — get there as early as you like, someone will be there from first light. If you go the night before there is always an orchid gathering in the Bowling Club.

THE IMPORTANCE OF OXYGEN TO THE ROOT SYSTEMS OF ORCHIDS

Kenneth K. Organ,
19 Kara Street,
Sefton, N.S.W. 2162

I have observed for many years the different growing capabilities of various types of orchids and the demise of many through all types of basic causes. It was not difficult to come to a conclusion that, unless the root systems were strong and healthy, the orchid did not flourish.

Investigations of various root systems on "sick" orchids revealed that invariably the medium used seemed to contribute to root break down. The type of medium showed that the usual basic materials of bark, gravel, charcoal, styrene foam, leaf mulch, etc., were acceptable if used in the correct size and proportions. Media that compacted were found to contribute to poor root structure and thus inferior plants. The porosity of the medium showed that the better it was, the healthier the plant was, with a strong root system. This proved to be particularly so for Australian native orchids.

Quite often the remark is made that the medium must not be too compacted, because the roots must have access to air. This poses the question as to what benefit the root of a plant can derive from air.

Air is primarily made up of oxygen and nitrogen and it is interesting to contemplate just how important the condition of the growing medium is in the root function of a plant. We know that the functions of root systems are primarily absorption, anchorage, conduction and storage. From the medium, roots must be able to absorb water and mineral salts.

The roots of a plant absorb the raw materials of water and mineral nutrients which are transported upward through the stem to the leaves. The leaves therefore, can be seen to act as "factories" in the synthesising of the compounds required for growth and reproduction, from the available materials.

For roots to function normally they must be supplied with a source of energy and a favourable environment. The top of the plant provides the sugars and the other carbohydrates which are transported through the stem down to the roots, where, through the process of respiration, they supply the necessary energy for optimum root functions.

Respiration in all living organisms, be it animal or plants, requires a steady supply of oxygen. Oxygen is also required for respiration in other parts of the plant, but supply there is normally adequate. Because of the usually tiny pore spaces in soils or media through which gases must move, aeration of a medium can very easily become limiting, which proves detrimental to the growth of the plant.

Therefore a good soil or medium mix must ensure the best possible aeration consistent with other growing requirements. The additional moisture retained by the soil or medium always reduces a relative volumetric amount of air space.

It is most essential that plants growing in containers, have a growing medium of adequte porosity. It is by diffusion that gases move into and out of the medium, although frequent applications of water may also be effective in displacing soil air. If the soil pore spaces are too small, water will fill them and reduce aeration and it is not until the water content has been lowered by evaporation or transpiration that normal aeration can take place.

Water logging causes denitrification and loss of nitrogen.

An interesting experiment as documented in *Plant Propagation Principles and Practice* by Hartmann and Kester, page 256–257 shows that in an extension of studies to several kinds of woody plants, it was noted that cuttings of different species did not respond to the same treatment in propagation. Some plants were affected by the calcium level and some were not.

Available oxygen in the rooting medium was found to be essential for root production.

The rooting of all cuttings increased markedly as the water in which they were rooted was aerated with increasing amounts of oxygen from 0–21%. When roots are produced near the surface of the rooting medium only, it generally indicates that the supply of oxygen in the medium is inadequate.

For maximum efficiency in the total respiration process of a plant (orchid) it is essential that all components are able to operate at a maximum level. In relation to roots, maximum efficiency cannot be obtained unless nutrients in solution and oxygen are available.

Optimum growth is always a desirable characteristic in all orchid growing and even if increased oxygen supply to the root system could be made available by complicated mechanical systems, it is easier to ensure that the roots have access to air as a natural source of oxygen.

Australian native orchids growing under natural conditions invariably have root systems that have plenty of access to air, thus ensuring a supply of oxygen to the root system.

It is most essential that the principles of root aeration be recognised when "domesticating" Australian orchids in collections, particularly the popular dendrobiums.

The Australian terrestrials require oxygen around their root systems and will not grow in fine media.

Some terrestrial orchids have adapted to growing in wet Sphagnum moss and have evolved to derive sufficient oxygen from the constant water supply. However, the majority of Australian orchids require adequate amounts of light, air and water. Decreasing any of these main components will have a detrimental effect on the plants ability to produce new growths and consequently flowers.

Root systems must also have regular supplies of water to enable soluble nutrients to be absorbed into it. Without the nutrients being in a soluble state the root system cannot perform all its required functions. Each component of air and water must therefore be available to the root system.

Water holding capacity of a medium is generally defined as the ability of the potting mixture to hold water against gravity and is measured as a percentage of the volume of water held after gravitational drainage. The available oxygen to the root systems of orchids is to be found in the pore spaces in the medium used. Pore space (porosity of aeration) of a field soil or potting mixture is an important measure of its suitability for foliage plant production. Foliage plant growth is often reduced and sometimes plants are killed because of poor aeration caused by compaction, excessive rainfall or overwatering of soils and potting mixtures with inadequate pore spaces. **Roots cannot absorb water or nutrients except in the presence of oxygen.** Roots emit carbon dioxide, which can become toxic unless sufficient air exchange exists between the medium and the atmosphere.

There are several methods of measuring pore space remaining after water has drained away owing to gravity. The pores not filled by water are called non-capillary pore space and account for the macropores that provide aeration during periods of high water application. Plants have varying tolerances to inadequate aeration but non-capillary pore space should be at least 5–10% in the potting medium. This is especially true with organic potting media since they decompose with time resulting in markedly decreased non-capillary pore space. The total volume of air filled capillary and non-capillary pore space (after drainage) should be between 10 and 20%. Excessive total pore space is not desirable since it indicates a low water holding capacity and causes more rapid drying out of potting media.

Even from the initial stages of the growth of an orchid from seed, oxygen supply is essential. The artificial sowing of the seed capsules of orchids did not progress very far until the experiments of Knudson in the early 1920's. L. Knudson, in 1922, first published his formula for the culture of orchid seedlings in flasks, which showed that large amounts of oxygen were required.

The conclusions reached through field observation, research and growing Australian native orchids in containers is that it is not only essential, but mandatory that the porosity of any medium used should be **at least 15%.** That is the amount of space that is left in the medium after the orchid is potted.

Too many Australian native orchids suffer from a cramped root system because insufficient attention is given to the porosity of the medium, limiting the amount of oxygen available to the root system.

Oxygen supply to the root system is one of the basic requirements for the successful culture of our Australian native orchids.

A THOUGHT

The amount of food absorbed by the roots decreases in the colder weather and in many cases ceases, known as the resting period. The rate at which a plant is growing determines the amount of substance absorbed, because if there is no internal movement of cell-sap, a state of equilibrium is reached, but if there is a continued movement of sap from the root to the leaves, the state of balance is then continuously destroyed and absorption of food by the roots takes place.

ORCHIDS OF SOUTH-WEST AUSTRALIA — PAST TO PRESENT

Andrew Brown

DISTRIBUTION AND BIOLOGY OF WESTERN AUSTRALIAN ORCHIDS

Many may not realise that orchids found in Western Australia occur in two disjunct regions, with twelve or so species endemic to the tropical north, particularly in the area on and around the Mitchell Plateau and a much larger group in the lower south-west. In the latter area they can be seen from near Shark Bay, south-east to Balladonia and east in a narrow coastal strip to Eyre on the Great Australian Bight. No epiphytic species are found in the south-west, all being terrestrial (geophytic) in habit. Habitats vary greatly and range from high rainfall Jarrah, Marri and Karri forests, winter-wet swamps and coastal heath, to much lower rainfall inland Mallee woodlands, shrublands, salt-lake margins and granite outcrops.

In Western Australia's largely Mediterranean climate of cool, wet winters and hot, dry summers most orchids flower during the autumn, winter and spring months. A few continue into summer but, with the exception of the Slipper Orchid, *Cryptostylis ovata,* all die back to dormant tubers which resprout following autumn rains.

It is often thought that flowering is limited to the winter and spring months, but at least a few species can be found at any time of the year. The first to appear is the soon to be named *Praecoxanthus aphyllus,* previously known as *Caladenia aphylla* (Plate 12). It flowers in March, while the last, the Common Mignonette Orchid, *Microtis media* begins to flower in November and continues well into February.

Western Australian orchids range in size from the tiny Dwarf Spider Orchid, *Caladenia bryceana* which has a single flower 2cm across and grows to a mere 6cm in height, to the tallest of all our orchids, the King Leek Orchid, *Prasophyllum regium.* This species grows to well over 2m in height and has up to 100 or more flowers.

Like other Australian orchids, those found in Western Australia rely heavily on soil fungi for their survival. The vast majority are pollinated by insects such as flies, bees, beetles and wasps and all produce thousands of tiny seeds which are wind dispersed.

This high degree of specialisation, added to their rather particular climatic, geographic and habitat requirements, has resulted in a great deal of speciation, particularly in *Caladenia, Pterostylis, Diuris, Thelymitra* and *Prasophyllum.*

As a result of this continuing evolution many species share the same common ancestors. They often look alike and have similar features. This has led to some difficulty being experienced in sorting out their ranking and as a result, they have often been regarded as members of complexes or races. Various botanists have named them as varieties, forms or simply put them in the "too hard basket", lumping them together under a single name. With a great deal more information at their fingertips today's botanists have developed a new understanding and are in the process of naming many new orchid taxa. To get a complete picture of just what rapid progress is now being made in orchid taxonomy it is worthwhile taking a look at the history of orchid nomenclature in Western Australia.

HISTORY OF NOMENCLATURE

The first collections of Western Australian orchids were made just over two hundred years ago during the months of September and October, 1791, when Archibald Menzies, Surgeon and Naturalist aboard the H.M.S. *Discovery,* found three species growing in the King George Sound (Albany) area. These were subsequently named *Leptoceras menziesii* after himself, *Caladenia flava* (Plate 13) and *Diuris longifolia.*

Since then 27 genera and over 330 taxa (species, subspecies and varieties) have been recognised as distinct in south-west Western Australia. This has tended to happen sporadically, at times when keen orchidologists were active. However, at no time has a greater surge of interest been shown than during the past seven years.

To give you some idea of the great strides that have occurred in orchid systematics during this time let us look at some of the publications that have come out over the past sixty or so years.

The first comprehensive book on Western Australian orchids was written by Emily Pelloe in 1930. In it she lists 139 taxa for the State and looking at several of the larger groups, lists 46 *Caladenia,* 8 *Diuris,* 4 *Drakaea,* 4 *Eriochilus,* 12 *Pterostylis* and 1 *Paracaleana.* The next major publication, titled *Orchids of the West,* was written by Rica Erickson in 1951 and revised in 1965. In it Rica lists 177 taxa, but, as many of the names used were incorrectly applied and have since been reduced to synonomy, the real figure at that time was more likely to be around 140

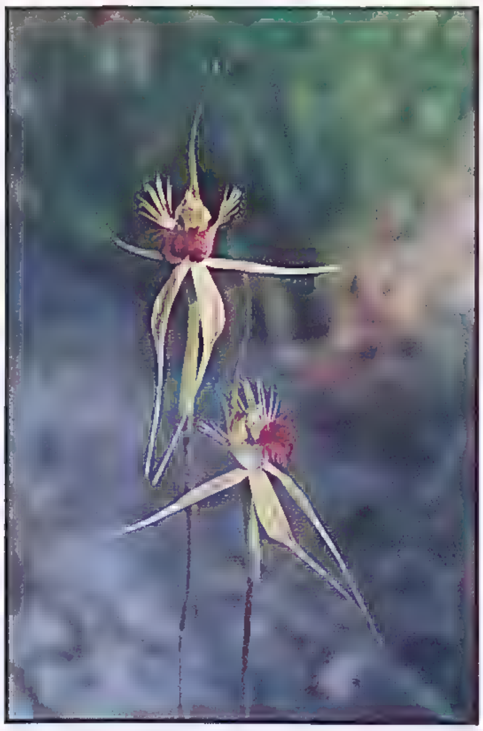


Plate 9: *Caladenia huegelii.*

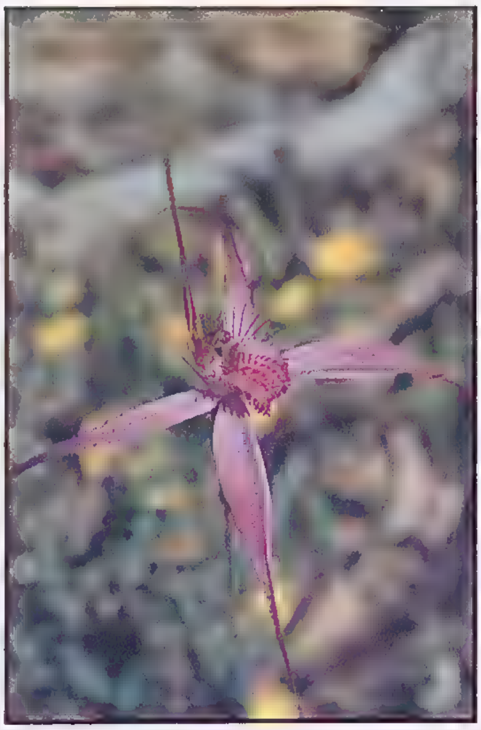


Plate 10: *Caladenia* species.

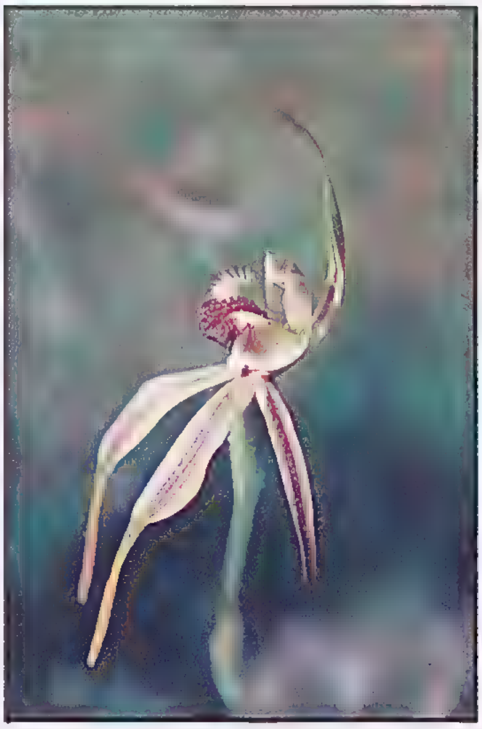


Plate 11: *Caladenia rhomboidiformis.*

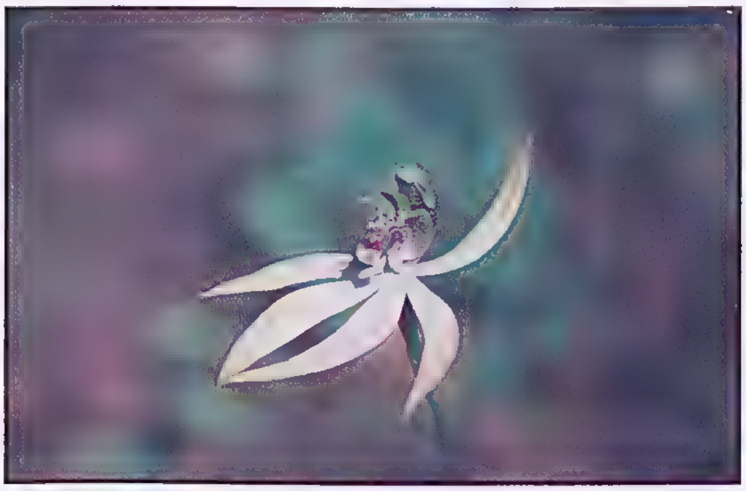


Plate 12: *Caladenia aphylla.*

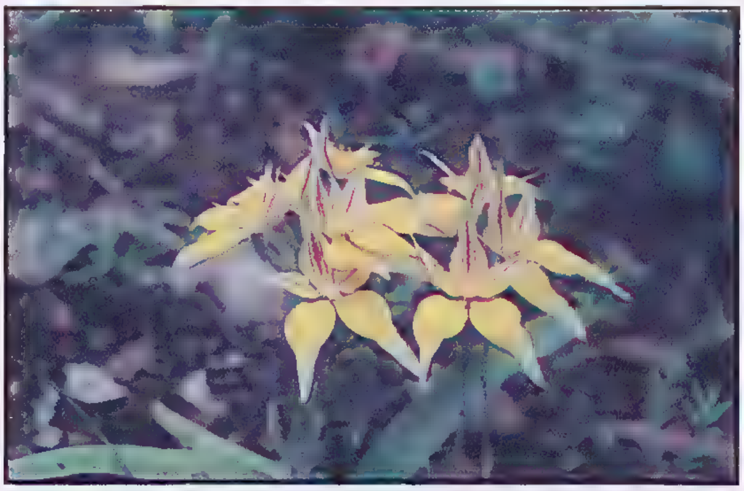


Plate 13: *Caladenia flava* subsp. nov.

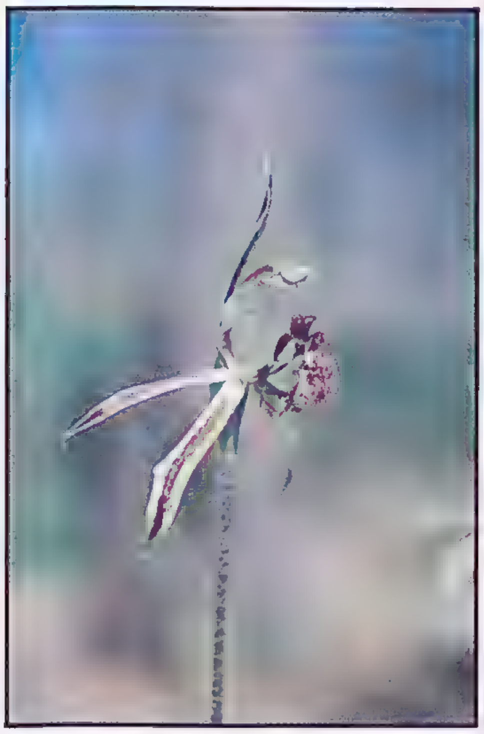


Plate 14: *Caladenia barbarossa.*

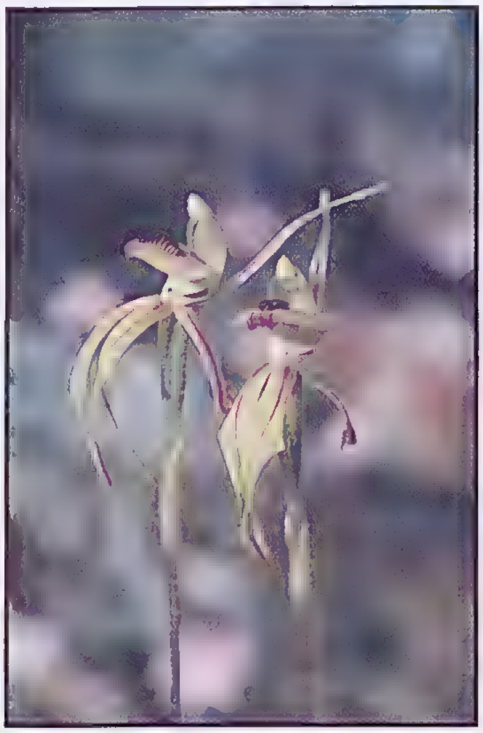


Plate 15: *Caladenia* species.

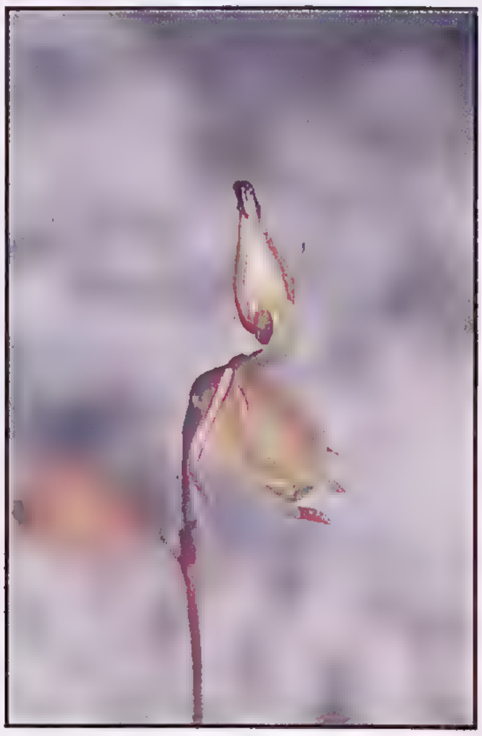


Plate 16: *Paracaleana* species.

Photos by A. Brown

taxa. This number did not dramatically increase between then and 1984 when *Orchids of South-West Australia* by Hoffman and Brown was first published. At that time some 141 taxa were recognised. However, compare those figures with the number of species and subspecies recognised in the 1992 Second Edition. *Caladenia* has risen from 46 to 126 despite the fact that a number will be placed in the new genera *Cyanicula, Leptoceras, Drakonorchis* and *Praecoxanthus. Diuris* has risen from 8 to 29, *Drakaea* and *Eriochilus* from 4 to 10, *Paracaleana* from 1 to 6 and *Pterostylis* from 12 to over 45. The total number of known taxa has risen from 141 to well over 330!!!

One may justifiably ask: "If these taxa are so distinct, why have they not been named before?"

Well, there are several answers to this question. Many species were thought to be variable in their morphology simply because they were so poorly known and collected. Little was known about their distribution, flowering times, habitat requirements and pollination. In the case of the Spider Orchids almost everything with red markings and clubs was considered to be a form of *Caladenia huegelii* (Plate 9), if it had filamentous petals and sepals and two rows of calli it was called *Caladenia filamentosa* and if it had four rows of calli it was called *Caladenia patersonii* var. *longicauda*. This was a most unsatisfactory arrangement and resulted in a great deal of confusion amongst amateurs and professionals alike, particularly when they found plants which obviously did not match published descriptions of known species.

When Steve Hopper and I first began working on orchid taxonomy we decided that *Caladenia* was the genus most in need of revision. We set about this by first familiarising ourselves with the known species. We then conducted numerous field trips throughout the south-west of the State and in the process, made many collections. It soon became apparent that many of the so called variable species consisted of quite distinct taxa with their own unique pollinators, habitat requirements, distributions and flowering periods.

Using a method devised by David Jones of the National Botanic Gardens, we carded eight to ten specimens collected at random from each population. We were then able to compare different populations of the same taxon and at the same time, were able to compare what we believed to be different taxa in order to note their differences. Literature searches had to be conducted and specimens obtained from other herbaria to check that these taxa had not already been named. In more recent times genetic studies have also been carried out to help sort out some of the more difficult species complexes.

Our studies, along with those of other researchers such as David Jones and Mark Clements, show that several names, including those of *Caladenia cristata, C. longliclavata* var. *magniclavata* and *Drakaea elastica* have been commonly applied to the wrong taxa, while species such as *Caladenia ensata, C. pectinata, C. ferruginea, Eriochilus tenuis* and *Diuris picta*, which had in the past been reduced to synonomy with other species, are worthy of recognition as species in their own right. Numerous other taxa, named as varieties, are also considered distinctive enough to elevate to species status. We soon also discovered that many species contained distinct geographical or habitat specific races. These are readily identifiable and subspecific status appears warranted.

One of the most interesting discoveries that we made was that three orchids, *Caladenia filamentosa* (32), *C. hugeleii* (20) and *C. longicauda* (25) (Plate 10) (the latter previously known as *C. patersonii* var. *longicauda*), each of which were thought to be a single variable species, consist of no less than 77 taxa, all with their own ranges of distribution, flowering periods, pollinators and habitat preferences. Other species that will be affected by our revision include *Caladenia longiclavata,* (Plate 11) which will be split into five species. *Caladenia falcata* and *C. doutchiae* (Plate 15) will be split into three and *C. integra* and *C. cairnsiana* into two. Finally *Caladenia flava* will be split into three subspecies and both *C. nana* and *C. reptans* into two subspecies. This will increase the number of known *Caladenia* from 55 in 1989 to 126 in 1993, despite nine having been removed.

One of the species to be removed from *Caladenia, C. menziesii,* had already been named *Leptoceras menziesii* by John Lindley in 1840. It contains a number of distinctive differences from *Caladenia* and will again be placed under that name. The new monotypic genus *Praecoxanthus* will be created to house *Caladenia aphylla.* Like *Leptoceras* it has glabrous rather than hairy stems and leaves and in fact appears to be more closely related to the South American genus *Codonorchis* than *Caladenia.* All the blue-flowered species will be placed in the genus *Cyanicula* and several new species are to be named. Lastly, *Caladenia barbarossa* (Plate 14) will become a member of the genus *Drakonorchis* and like *Cyanicula,* new species will be included.

We then extended our research into related genera and found that like *Caladenia* many were undescribed. *Eriochilus,* for instance, contains seven undescribed taxa and the previously submerged *E. tenuis* is now known to be a good species. *Drakaea* and *Paracaleana* each contain five undescribed species. We also plan to remove *Lyperanthus nigricans* and *L. forrestii* (Plate 18) from *Lyperanthus* and place them both in the eastern Australian genus *Burnettia.*

In addition to the work that Steve Hopper and I are doing, several other notable researchers are working on Western Australian genera. David Jones and Mark Clements of the National Botanic Gardens are revising *Diuris* and *Pterostylis* while Bob Bates from South Australia is looking at *Microtis* and *Prasophyllum.*

Once you have read the systematic paper on *Caladenia* and allied genera which we plan to publish in *Orchid Research Volume 3* and have browsed through the second edition of *Orchids of South-west Australia,* I think you will agree that Western Australia does indeed contain a number of new and distinct orchid taxa.

CAPTIONS FOR PLATES

Plate 9: A typical example of *Caladenia huegelii.* At least 20 taxa previously included under that name will be described as new.

Plate 10: This attractive pink flowered spider orchid was, until recently, regarded as being simply a form of *Caladenia longicauda.*

Plate 11: Formerly known as *Caladenia longiclavata* var. *rhomboidiformis* this orchid has now been raised to species level.

Plate 12: It is intended that *Caladenia aphylla* be placed in the new monotypic genus *Praecoxanthus.*

Plate 13: This attractive subspecies of *Caladenia flava* is confined to the higher rainfall forest areas.

Plate 14: Due to a number of morphological differences it is intended to remove this unusual orchid from *Caladenia* and place it in the new genus *Drakonorchis.*

Plate 15: Once regarded as a from of *Caladenia doutchiae* this orchid can be found growing on rocky hillsides in the Southern Cross — Paynes Find area.

Plate 16: Although locally common this undescribed species of *Paracaleana* is confined to a few moist situations in the Kalbarri area.

Plate 17: *Diuris magnifica* is one of a growing number of recently named orchid species endemic to Western Australia.

Plate 18: It is believed that this species is more closely related to the eastern Australian genus *Burnettia* than *Lyperanthus.*

Plate 19: One of the many undescribed species of *Pterostylis* found in Western Australia.

Plate 20: This is one of five undescribed *Drakaea* species.

Plate 29: This recently discovered *Thelymitra* species is known from the Walpole area.

Plate 30: *Thelymitra dedmaniae,* first collected near York in 1934, not seen again for over 50 years.

BOOK REVIEW

[Ed.—From the A.N.O.S. Victorian Group Bulletin — February, 1993]

ORCHIDS OF SOUTH-WEST AUSTRALIA. Second Edition. By Noel Hoffman and Andrew Brown.

240mm x 170mm, 420 pages, hard cover, 327 colour plates, 34 line drawings.

Published by the University of Western Australia Press, Nedlands, Western Australia, 1992.

Price approx. $60.00 Aust.

Although this is a second edition, it bears no great resemblance to its forerunner as the accompanying table will illustrate. Those possessing a copy of the first edition will certainly want and require this book to keep abreast of the enormous changes that are currently taking place in the taxonomy and nomenclature of Western Australian orchids.

	1ST EDITION	2ND EDITION
Page size (mm)	210 x 140	240 x 170
Number of pages	382	420
Pages per taxon	generally 2	1
Named species	117	227
Unnamed species	25	38
Sub-species	0	60
Varieties	24	2
Named forms	2	0
Unnamed forms	1	0
Total taxa covered	169	327
Number of genera	21	27

As well as the many differences in format and content from those in the first edition, much remains essentially unchanged. The attractive and useful pictorial key is still present as is the introductory chapter entitled "Distribution, Structure and Growth", a slightly enlarged glossary, well executed line drawings and maps of locations used in the text. Completely new is a short chapter dealing with orchid photography.

It is most unfortunate that the release of this book actually predates the publication of many of the new species and sub-species names used in the text. These names are, therefore, not valid until formal descriptions are published elsewhere. Many unfamiliar hybrid names have also been used in the text; these too are presumably to be described elsewhere.

The book is beautifully presented and has been bound in a robust fashion making it ideal for use in the field. The bulk of the work is taken up by the species accounts, each of which occupy one page. The genera have not been arranged according to any standard covention but related genera have been kept close together to assist quick and easy comparisons. Likewise, the species within the genera are arranged according to their relationships to one another.

The species are treated using a constant format. The information supplied consists of the currently accepted scientific name and taxonomic authority, common name(s), flowering season, number of flowers, five selected plant dimensions, a distribution map, a colour photograph and text discussing such things as taxonomy, habitat, distribution, biology and conservation status.

It is interesting to see the large number of sub-species that appear in the book. Although the concept of varieties and sub-species has fallen into disuse in recent times it remains useful in that it maintains nomenclatural links between closely related taxa. It is, however, difficult to decide when recognition at species level is warranted. For example, *Caladenia chapmanii* appears to fall well within the variation displayed by the twelve named sub-species of *Caladenia varians*. Why it has been treated as a distinct species is unclear. As well as the scientific name, a common name is given for each species, even those recently described and those yet to be described. Many of these are obviously contrived rather than having arisen spontaneously from popular usage. I would question the need to invent these names as many are very cumbersome and some are verging on the ludicrous.

The photographs are of a uniformly high standard and generally show enough fine detail to enable the user to differentiate between some very similar species. The colour reproductions have apparently been made from 35mm slides which generally fit a rectangular format better than they do the predominantly square format presented in this publication. As a result of cropping, some of the photographs have the extremities of the flowers missing (e.g. pages 26, 29, 40, 59, 79, 81, 101, 339, 366, 370, etc.) and several other photographs have a composure that is not as pleasing to the eye.

The information supplied in the text will further help to identify species. Comparisons of key floral or leaf features with those of other similar, likely to be confused, species are supplied. Also the habitat requirements for each species are described including such features as their response to fire and to available moisture levels. The dominant components of the habitats are usually referred to by their common names. To we "easterners" (and I dare say to a few "westerners") names such as Wandoo, Yate, Jam Trees, Tuart, Marri and Peppermint don't mean a great deal without some further explanation or, preferably, with an accompanying scientific name. Distribution is given using town names and geographical features, many of which, regrettably, do not feature on the location maps in the front and back end-papers.

The distribution maps, although much reduced in size from those in the first edition, are certainly large enough to clearly depict the currently known range of each species. Where the species also occurs in eastern states, this is sometimes stated in the text and sometimes it is not.

Probably the most controversial aspect of this publication is the creation of three new genera, *Praecoxanthus, Cyanicula* and *Drakonorchis,* to accommodate several species previously included in *Caladenia.* Also the placement of *Caladenia menziesii* into the monotypic genus *Leptoceras,* the inclusion of *Lyperanthus nigricans* and *L. forrestii* in *Burnettia* and the continued use of the generic name *Paracaleana* are noteworthy. How these proposed changes are to be regarded by the taxonomic community only time will tell.

The use of hybrid names, particularly in *Caladenia,* is at times confusing. For example, on page 43, *C.* X *ericksoniae* is said to be a natural hybrid between *C. polychroma* and *C. cairnsiana.* On pages 51 and 131, *C.* X *ericksoniae* is said to be a natural hybrid between *C. incensa* and *C. pachychila.* Such anomalies have arisen due to the splitting up of one or both parent species into several distinct species. Where this has occurred, surely a narrower view should be taken as to the true identity of the named hybrid.

The south-west corner of the Australian continent contains one of the world's most beautiful, fascinating and complex terrestrial orchid floras. This book is by far the most useful and comprehensive treatment of the orchids of that region yet to appear. I would strongly recommend it, not only to students of Western Australian orchids, but also to those with an interest in orchids in general.

Jeff Jeanes

MAPPING THE CONTEMPORARY DISTRIBUTION OF NEW ZEALAND'S ORCHIDS

Ian St George and Ben Stewart,
Wellington, N.Z.

INTRODUCTION

From its beginning in 1983 the New Zealand Native Orchid Group collected information on the whereabouts of wild orchid species. New Zealand is a long thin country and orchid enthusiasts were occasional to rare — we had little opportunity to meet and talk and we needed the Group's *Newsletter* as a forum. Early issues were rich in regional lists of species. At least to some extent at first the exercise was one of familiarisation — many of us were beginners and we wanted to know where to go and look for unfamiliar species. There was at the same time a perception that the destruction of habitat was accelerating and that the "official" ranges of many species were possibly inaccurate and certainly out of date. What we needed were *modern* reports of where the orchids were.

By 1987 the Group had about 150 members, mostly knowledgeable amateurs, but with a sprinkling of professional botanists too — and relations were convivial. Perhaps everybody recognised that expertise in this subject is as likely to result from self education by the enthusiast as from formal education in a tertiary institution: there was little of the unhealthy anxiety about amateurs evident elsewhere.

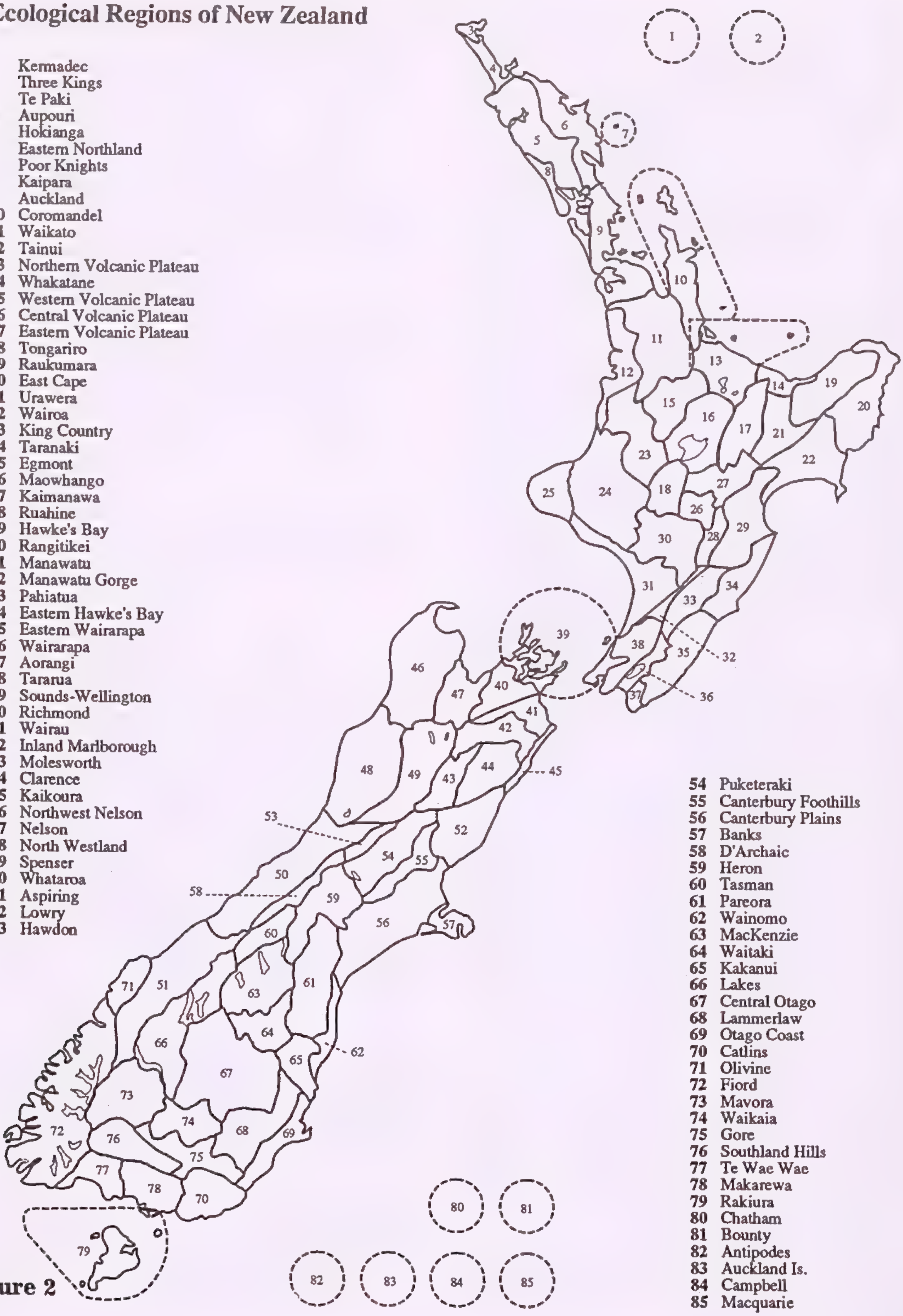
MAPS

A couple of years earlier the Department of Conservation had produced maps of New Zealand's Ecological Districts and Regions. Though by 1973 there were already no less than 43 systems of subdividing New Zealand for administrative purposes, this was something new. In 1979 a workshop had recommended that a Biological Resources Centre be established, to "plan for and see developed a co-ordinated approach to taxonomic, distributional and ecological resource studies so that data are available in a useful form for management and research purposes". Our Reserves Act of 1977 was to be the spur, for one of its purposes was to ensure the "preservation of representative samples of all classes of natural ecosystems and landscapes which in the aggregate originally gave New Zealand its own recognisable character".

By 1982 over 260 Ecological Districts in 85 Ecological Regions had been suggested: Dr Brian Molloy, mentor of New Zealand orchidologists, was closely involved in the South Island mapping. First edition maps were widely distributed for advice and comment and second editions were developed by 1983.

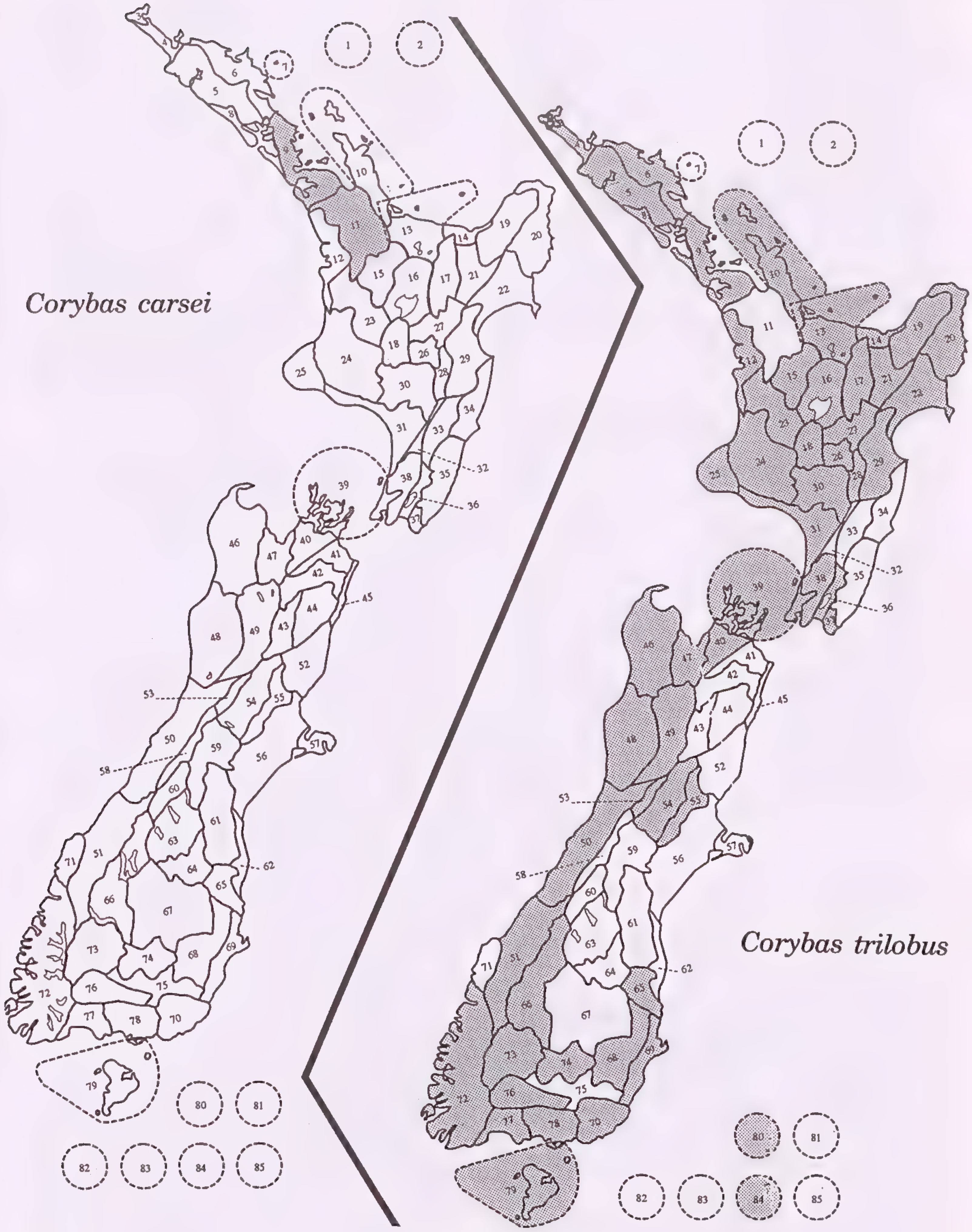
An Ecological District was defined as "a local part of New Zealand where the topographical, geological, climatic, soil and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities". It is important to recognise that

Ecological Regions of New Zealand



1	Kermadec
2	Three Kings
3	Te Paki
4	Aupouri
5	Hokianga
6	Eastern Northland
7	Poor Knights
8	Kaipara
9	Auckland
10	Coromandel
11	Waikato
12	Tainui
13	Northern Volcanic Plateau
14	Whakatane
15	Western Volcanic Plateau
16	Central Volcanic Plateau
17	Eastern Volcanic Plateau
18	Tongariro
19	Raukumara
20	East Cape
21	Urawera
22	Wairoa
23	King Country
24	Taranaki
25	Egmont
26	Maowhango
27	Kaimanawa
28	Ruahine
29	Hawke's Bay
30	Rangitikei
31	Manawatu
32	Manawatu Gorge
33	Pahiatua
34	Eastern Hawke's Bay
35	Eastern Wairarapa
36	Wairarapa
37	Aorangi
38	Tararua
39	Sounds-Wellington
40	Richmond
41	Wairau
42	Inland Marlborough
43	Molesworth
44	Clarence
45	Kaikoura
46	Northwest Nelson
47	Nelson
48	North Westland
49	Spenser
50	Whataroa
51	Aspiring
52	Lowry
53	Hawdon
54	Puketeraki
55	Canterbury Foothills
56	Canterbury Plains
57	Banks
58	D'Archaic
59	Heron
60	Tasman
61	Pareora
62	Wainomo
63	MacKenzie
64	Waitaki
65	Kakanui
66	Lakes
67	Central Otago
68	Lammerlaw
69	Otago Coast
70	Catlins
71	Olivine
72	Fiord
73	Mavora
74	Waikaia
75	Gore
76	Southland Hills
77	Te Wae Wae
78	Makarewa
79	Rakiura
80	Chatham
81	Bounty
82	Antipodes
83	Auckland Is.
84	Campbell
85	Macquarie

Figure 2



Corybas carsei

Corybas trilobus

Figure 3 **Distribution Maps**

these were not faunistic, not botanical, not landscape, nor habitat: but areas of *ecological* homogeneity. A Region was an aggregation of adjacent Ecological Districts with very closely related characteristics (in some cases a Region was one Ecological District with unique features).

ORCHID MAPPING

In 1987 the distribution mapping effort of the Group was formalised into a national Mapping Scheme. Observations were accepted from a twenty year period (1972 to 1992) representing the current status of orchid distribution and people could report any contemporary or earlier observations from those two decades for five years ending in 1992. Funding was sought and granted from Lottery Science and annual grants have been made since 1987.

Reporting forms were devised and were included in *Newsletter* mailings several times. For a particular Region, reporters would list orchid species, giving additional information on habitat, flowering times, associations and abundance. It was soon realised that the request for these collateral data either made the reporting too complex to be sufficiently accurate, or actively discouraged reporting: in the end we settled for a simple format asking for a list of species by Region, with the date as the only extra.

We recognised that the 260 plus Ecological Districts were the fundamental units, but we had only 150 members and pragmatism demanded the art of the possible — we settled for recording by the 85 Ecological Regions.

As reports came in they were coded by Ecological Region and entered on an IBM compatible wordprocessing program by species and by Region, for later transfer to maps.

PROBLEMS

The official maps were too big and too expensive to reproduce for everyone, though the boundaries among different Regions were clear; when the maps were redrawn to a smaller scale the boundaries were hard to interpret. A Matamata resident wrote: "I drove fifteen kilometres from Te Poi up into the Kaimais on the Tauranga Road and I walked about a kilometre north. I am not sure whether or not I crossed the border between Regions 11 and 13?" We could refer to the large scale maps and make the determination.

The Ecological Regions maps were eventually reproduced on a MacIntosh computer using the program Adobe Illustrator. This program produced high quality images in a Postscript format, which allowed the production of different sizes of images or line weights without loss of resolution. Ecological Regions can be shaded, patterned or colourised for printing. Sadly, the program is not compatible with the data sorted on an IBM compatible personal computer, so they have had to be re-entered. Every researcher knows that the more often data have to be entered manually, the greater the fallout and the greater the eventual error.

We are largely a Group of amateurs, but we are the best we have. A scheme such as this could not work if it relied on reports from the professionals interested in orchids: there are simply not enough of them. But amateurs make mistakes in classification. We provided the names of several experts who might identify a plant when the finder was uncertain as to its species, but were unable to recognise, let alone intervene when the finder was certain but wrong. That kind of error is the bane of any multicentric research.

We live (meekly protesting) in the day of the taxonomic splitter, trying to keep up with increasing numbers and new names. Where a recognised species has been divided into several new ones, the amateur is late to realise what has happened. What does the distribution mapper do when a report of *Caladenia carnea* comes in? Is it the new and restricted version of *C. carnea,* or does the reporter mean one of the several now separate species once included in *C. carnea* such as *C. iridescens, C. alata, C. catenata, C. minor, C.* "green column" and so on? Where the professional in doubt would make no report or would check the current status, the amateur might report any one of the possibilities. And, worse, what can we do when botanical etiquette demands silence?

Even with reporting restricted to 85 Ecological Regions, 150 members of a Group such as ours may not have visited and recorded the species present in all. New Zealand has some inaccessible Regions — offshore and outlying islands are the obvious ones, but there are other remote and mountainous areas that few visit. And there were populous and often-visited areas that, for quite unfathomable reasons, nobody bothered to report.

PLANS

What we plan is to publish in the best form we can, what is available now. There are gaps (we wish there weren't, but only the naive or dishonest would claim immaculate data) and that must be accepted. The publication may even act as a spur to further reporting to fill the gaps.

In the end, though, we believe these orchid distribution maps do represent the best information available.

FIGURE 2

Shows the Ecological Regions of New Zealand.

FIGURE 3

The Distribution maps for *Corybas carsei* (left) and *Corybas trilobus* (right). (*C. trilobus* is probably universal in New Zealand and its reported distribution is probably a fair indication of the incompleteness of reporting).

ACKNOWLEDGEMENTS

Contributors to the Mapping Scheme have included no less than a third of our members (and a few others) and it is a pleasure to acknowledge them: Nancy Adye, Mrs C. L. Aston, Karlie Birchall, Ross Bishop, Delphine Cox, Sarah Beadel, Ella Campbell, D. Catchpole, L. P. Chrystall, Noeleen Clements, Ida Collett, Peter de Lange, Pat Enright, Max Gibbs, Bob and Beryl Goodger, Dan Hatch, Margaret Hopkins, Bruce Irwin, Jean Jenks, Sandra Jones, Brian Killen, W. F. Liddy, Doug McCrae, Barbara McGann, David McNaughton, Pauline Mayhill, Mark Moorhouse, Manfred Peterek, Kevin Ross, Stella and John Rowe, Betty Seddon, Philip Simpson, Mary Skinner, Val Smith, T. A. Smith, Gordon Sylvester, I. J. Tweedy, Gordon Watson, Morley West, A. E. Wright, Wilbur Wright, Lyn Young.

A.N.O.S. AWARDS

Darryl Smedley

1. *Pterostylis pulchella* 'Unknown' — Award of Cultural Commendation. Bernie Fletcher, A.N.O.S. Sydney Group Winter Show, 12th April, 1987.
2. *Sarcochilus hartmannii* 'Red Snow' — Highly Commended Certificate. Ken Russell, A.N.O.S. Sydney Group Sarcanthinae Show, 22nd October, 1989.
3. *Sarcochilus hartmannii* 'Noelene' — Highly Commended Certificate. Ken Russell, A.N.O.S. Sydney Group Sarcanthinae Show, 22nd October, 1989.
4. *Dendrobium* David Baver 'Monroe' — Highly Commended Certificate. Laurie Jarvis, 2nd A.N.O.S. Autumn Show, Kincumber, 29th April, 1990.
5. *Caladenia patersonii* 'Conference' — Highly Commended Certificate. Les and Kay Nesbitt, 1st A.N.O.S. Conference and Show, Wollongong, 27th September, 1990.
6. *Sarcochilus* Jewel 'Dungog' — Highly Commended Cerfificate. (See Plate 24). Sid Batchelor, A.N.O.S. Sydney Group Sarcanthinae Show, 21st October, 1990.
7. *Sarcochilus* Jewel 'Dungog' — Award of Distinction. Sid Batchelor, A.N.O.S. Sydney Group Sarcanthinae Show, 21st October, 1990.
8. *Phalaenopsis amabilis* 'Moonshine' — Award of Merit. Mike Harrison, Special Judging, Baulkham Hills, 18th November, 1990.
9. *Dendrobium kingianum* 'Speckles' — Highly Commended Certificate. Neil and Meg Finch, A.N.O.S. Sydney Group Spring Show, 20th September, 1991.
10. *Dendrobium kingianum* 'Speckles' — Award of Distinction. Neil and Meg Finch, A.N.O.S. Sydney Group Spring Show, 20th September, 1991.
11. *Dendrobium schneiderae* var. *major* 'The Major' — Highly Commended Certificate. (See Plate 23). Gerry Walsh, 4th A.N.O.S. Autumn Show, Roseville, 5th April, 1992.
12. *Dendrobium cuthbertsonii* 'Orange Glow' — Award of Cultural Commendation. Phil and Yvonne Spence, 4th A.N.O.S. Autumn Show, Roseville, 5th April, 1992.
13. *Dendrobium schneiderae* var. *major* 'The Major' — Award of Cultural Commendation. Gerry Walsh, Judges Panel Meeting, 6th April, 1992.
14. *Dendrobium striolatum* 'Ruffles' — Highly Commended Cerfificate 75.93 points. Neil and Meg Finch, A.N.O.S. Sydney Group Spring Show, 18th September, 1992.
15. *Dendrobium kingianum* 'Steve' — Award of Distinction 5 for 2 against. Sid Batchelor, A.N.O.S. Sydney Group Spring Show, 18th September, 1992.
16. *Dendrobium* Brinawa Charm 'Lucky's Toy' — Award of Merit 82.08 points. (See Plate 25). Neil and Meg Finch, A.N.O.S. Newcastle Sarcanthinae Show, 15th October, 1992.
17. *Sarcochilus falcatus* 'Cheryl' — Award of Cultural Commendation 82.3 points. John Andrews, A.N.O.S. Sydney Group Sarcanthinae Show, 25th October, 1992.
18. *Cymbidium canaliculatum* 'Melba' — Highly Commended Certificate 79.8 points. (See Plate 27). Eric Webeck, A.N.O.S. Sydney Group Meeting, 20th November, 1992.
19. *Cymbidium canaliculatum* 'Melba' — Award of Cultural Commendation 83.8 points. Eric Webeck, A.N.O.S. Sydney Group Meeting, 20th November, 1992.

Summary of Awards to date

AM	—	2	Species	—	12	Terrestrials	—	2
HCC	—	9	Hybrids	—	3	Epiphytes	—	13
AD	—	3						
ACC	—	5						

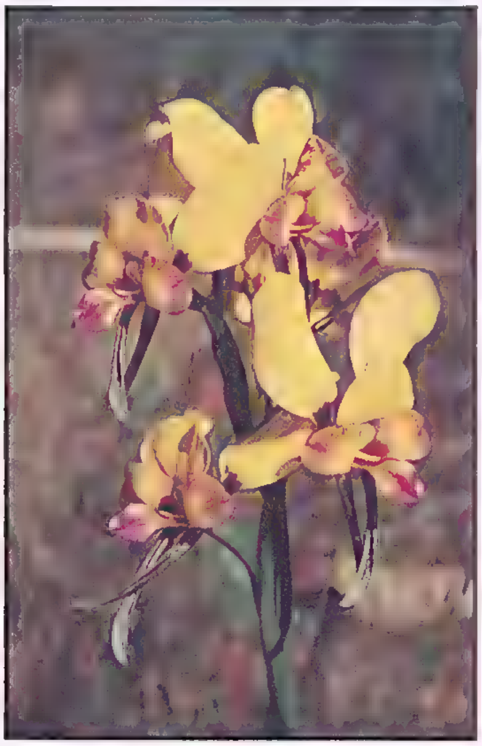


Plate 17: *Diuris magnifica.*
Photo: A. Brown.

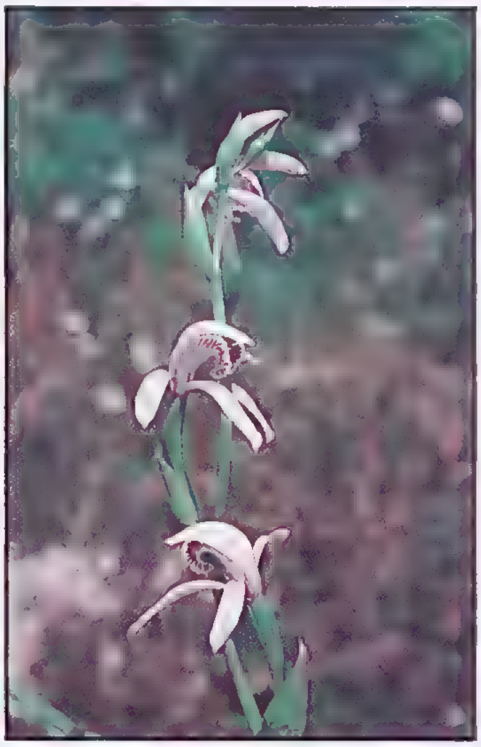


Plate 18: *Lyperanthus forrestii.*
Photo: A. Brown.

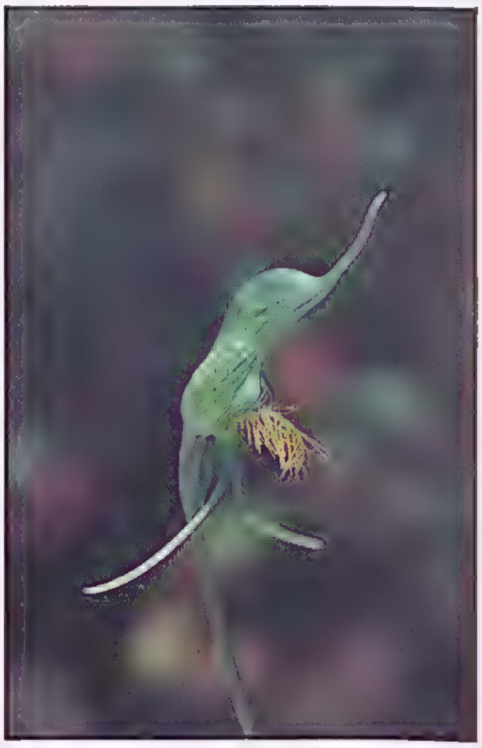


Plate 19: *Pterostylis* species.
Photo: A. Brown.

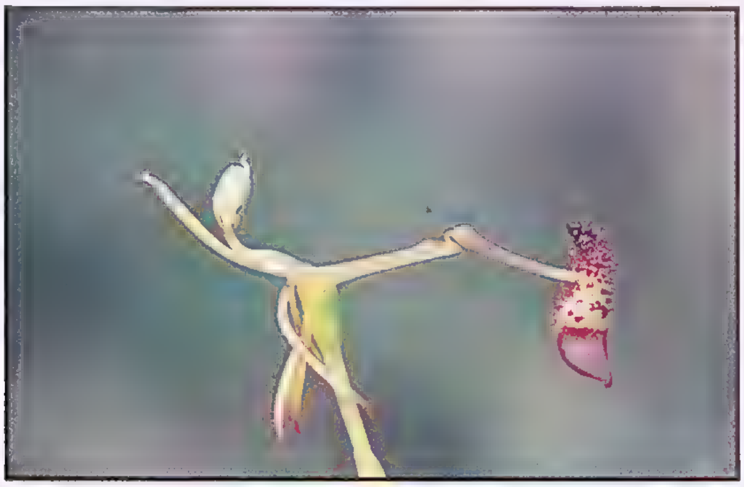


Plate 20: *Drakaea* species. Photo: A. Brown.

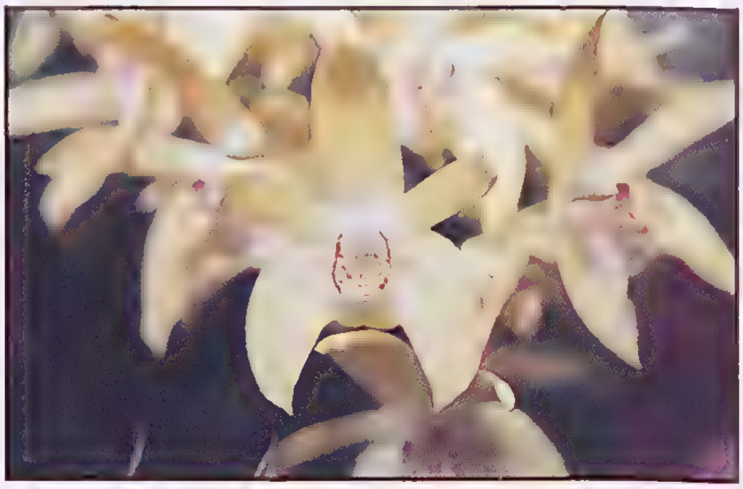


Plate 21: *Dendrobium* Tweed 'Big Mother' AM/NSW.
Photo: C. Brandon.

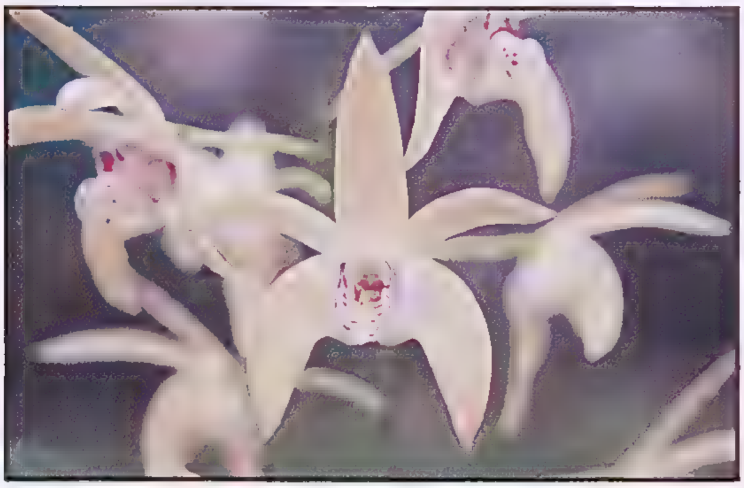


Plate 22: *Dendrobium* Colonial Bullion 'Peachy' AM/NSW. Photo: D. Wood

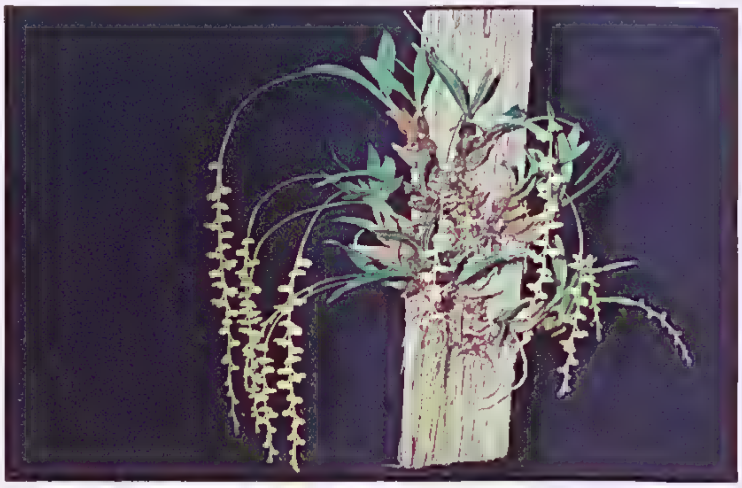


Plate 23: *Dendrobium schneiderae* var. *major* HCC/ACC/ANOS. Photo: D. Titmuss.

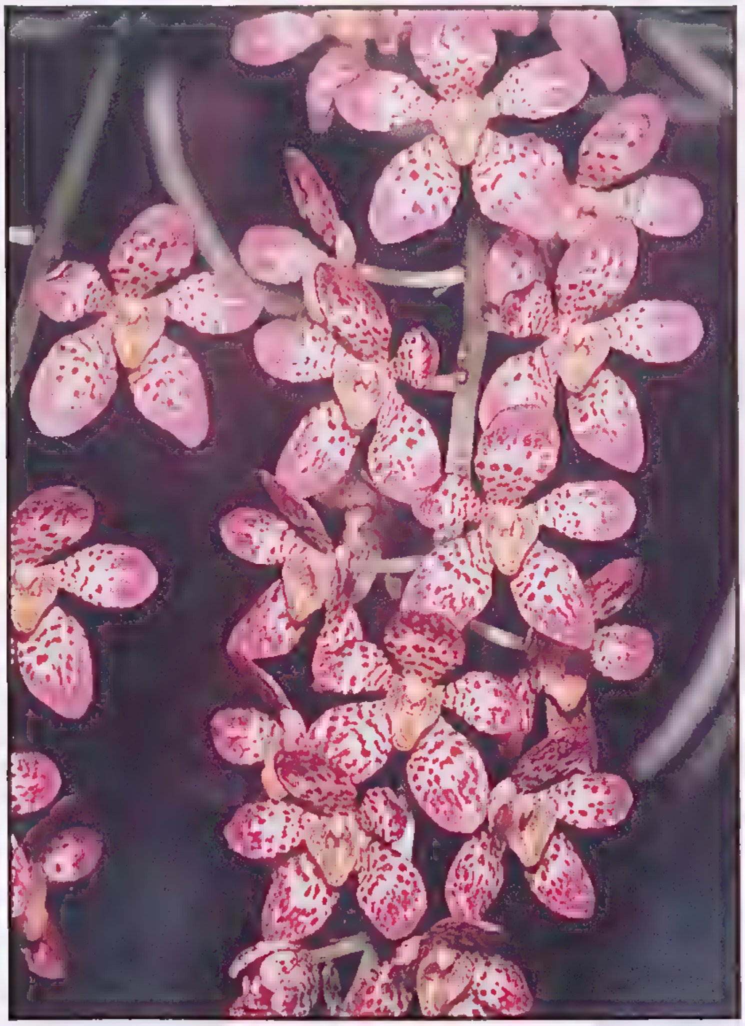


Plate 24: *Sarcochilus* Jewell 'Dungog' HCC/AD/ANOS. Photo: D. Titmuss.

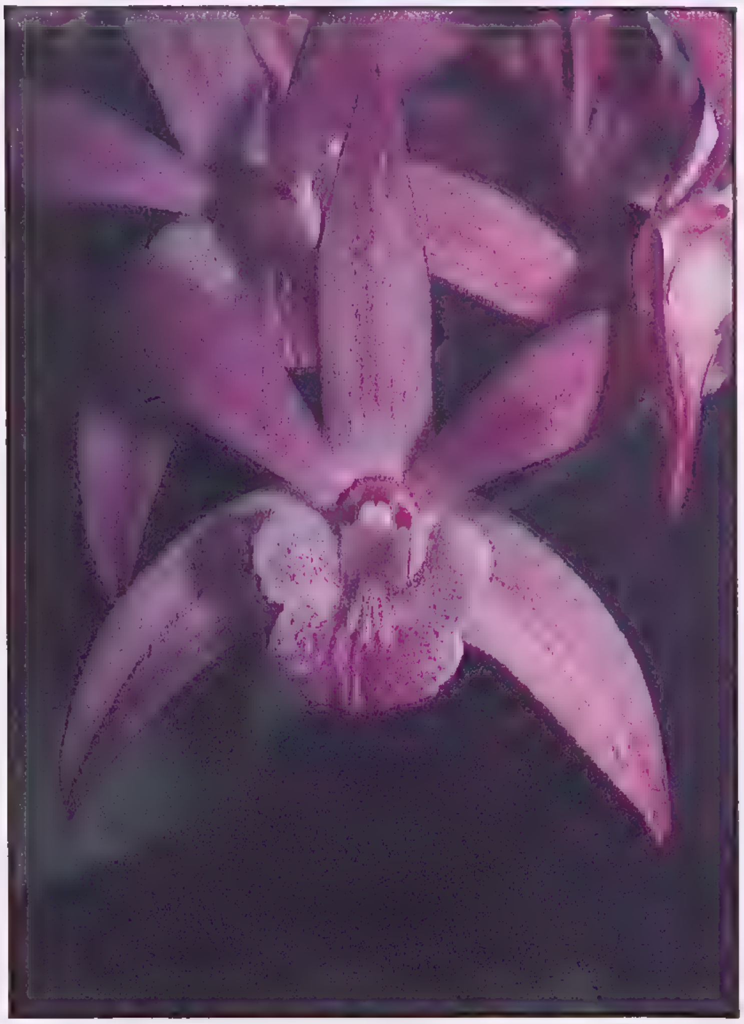


Plate 25: *Dendrobium* Brinawa Charm 'Lucky's Toy' AM/ANOS. Photo: N. Finch.

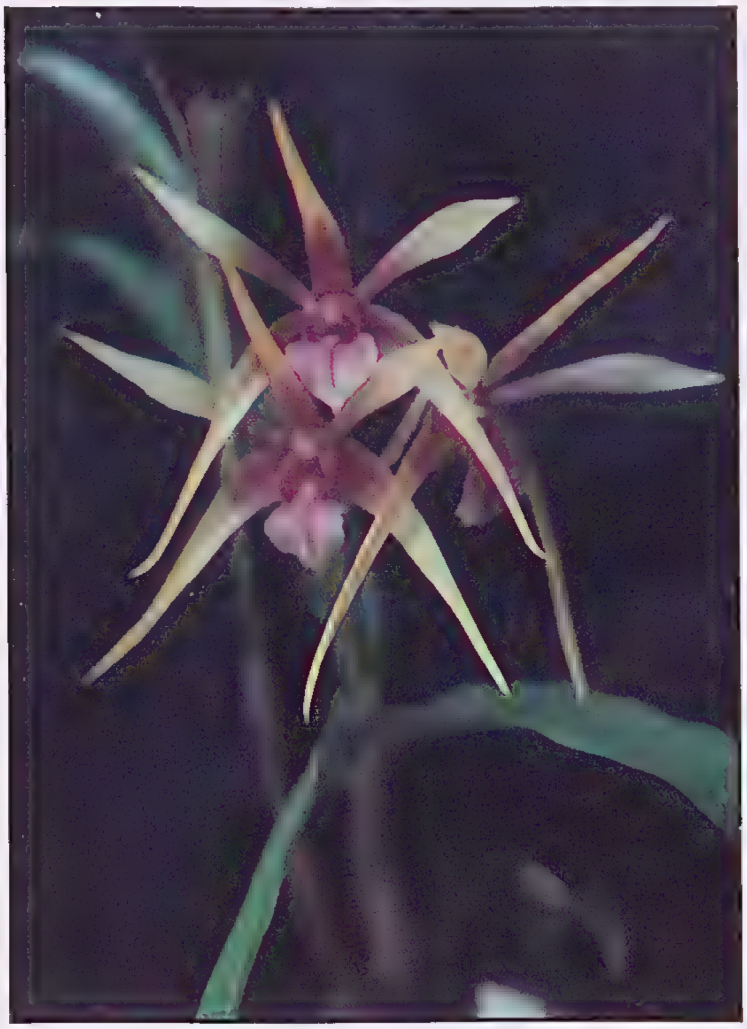


Plate 26: *Dendrobium* Elegant Lace. Photo: B. Mules.

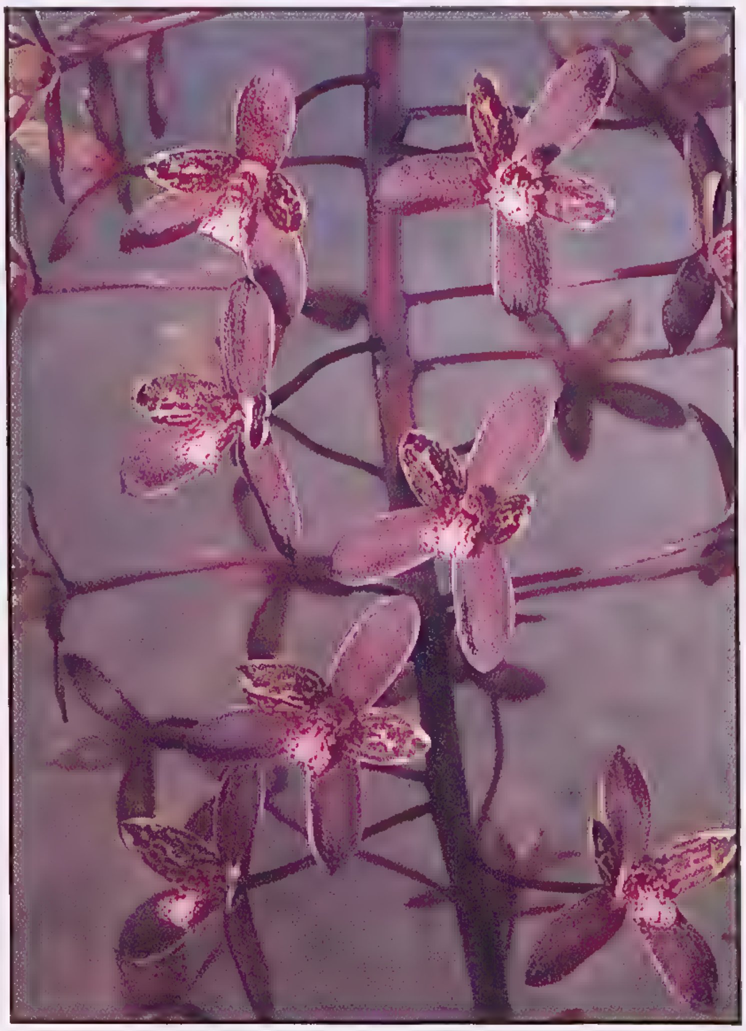


Plate 27: *Cymbidium canaliculatum* 'Melba' ACC/ANOS. Photo: D. Titmuss.

IRA BUTLER TROPHY COMMITTEE

Ruth Rudkin,
18 Lyle Avenue, Lindfield, N.S.W. 2070

TROPHIES AWARDED FOR 1992

Gold Trophy

Champion Australian Native Orchid Hybrid of 1992

Sarcochilus Jewell 'Dungog' HCC/AD/ANOS

Owner Sid Batchelor, Hybridist Ken Russell

This plant also won the Champion Australian Native Hybrid Section of the A.N.O.S. Sydney Group Inc. *Sarcanthinae* Show.

This year there were 26 nominations, all eligible for judging which was very pleasing. The standard of both plants and photography has improved markedly. It must be stressed that judging is based on the image as seen on the screen, from the transparencies provided, plus the description of the plant and flower as given on the nomination form by the Registrar.

LIST OF NOMINATED PLANTS

Awarded plants — (eligible for judging for the gold trophy but not eligible for a silver trophy, which is for show champions)

Dendrobium Brinawa Charm 'Lucky's Toy' AM/ANOS (see Plate 25). Owners Neil and Meg Finch. Hybridist Neil Finch.

Dendrobium Colonial Bullion 'Peachy' AM/NSW (see Plate 22). Owner Dennis Wood. Hybridist Phil Spence.

SILVER TROPHIES

Champions of Shows of A.N.O.S. Groups or Native Orchid Societies

Group or Society	Plant	Owner	Hybridist
ANOS Autumn Show (Host: Warringah)	*Dendrobium* Hilda Poxon	D. Floyd	—
Central Coast Spring Show	*D.* Yondi	N. Finch	S. Batchelor
Orchid Glenn Nursery Show	*D.* Red Ballerina	M. Harrison	W. T. Upton
Far North Coast Spring Show	*D.* Warrior	N. & K. Mitchell	—
Native O.Soc. of S.A., Spring Show	*D.* Elegant Lace (Plate 26)	B. Mules	W. T. Upton
Port Hacking Spring Show	*D.* Buttercup	C. Brandon	C. Brandon
Sydney Spring Show	*D.* Star of Riverdene 'Amanda'	R. Findlater	S. Batchelor
Warringah Spring Show	*D.* Miara	N. & M. Finch	N. Finch
Wollongong & D.O.S.			
Autumn Show	*Pterostylis* X *furcillata*	A. Stevenson	—
Spring Show	*D. semifuscum* X *D. agrostophyllum*	R. Wheeldon	—
Sarcanthinae Shows			
Newcastle	*Sarcochilus* Canary 'Tweety'	N. & M. Finch	N. Finch
Port Hacking	*S.* Southern Cross	D. Curry	N. Finch
Wollongong	*S.* Canary X *Rhinochilus* Dorothy	R. Wheeldon	—

Champion Australian Native Orchid Hybrids of State Societies Shows

Society	Plant	Owner	Hybridist
Orchid Club of S.A.			
Autumn Show	*Dendrobium* Hilda Poxon	M. Stroud	—
Winter Show	*D.* Aussie Child 'Wilpena Sunset'	R. & P. Rankin	P. Spence
Spring Show	*D.* Falcon Star	R. Herraman	—
O.S. of N.S.W.			
Winter Show	*D.* Aussie Victory 'Pale Face'	N. Roper	P. Spence
Spring Show	*D.* Bardo Rose	A. Leece	B. Overall
O.S. of W.A.			
Winter Show	*D.* Pauline Rankin 'J'	J. & D. Fleming	—
Spring Show	*D.* Miara	J. & D. Fleming	—

Grand Champions of Shows of State Affiliated Societies

Society	Plant	Owner	Hybridist
Combined Societies Show, Hurstville Spring Show	*D.* Tweed "Big Mother' AM/NSW (see Plate 21)	C. Brandon	C. Brandon
Melville & District (W.A.) Spring Show	*D.* Red River 'Iris'	R. & D. Bitton	J. Mewburn

Dendrobium Colonial Bullion 'Peachy' AM/NSW

Dennis Wood,
118 Lantana Road, Engadine, N.S.W. 2233

In July, 1985, I purchased a flask of *D.* Eureka X *D.* Sunglow from Phil Spence. I deflasked the seedlings in September, 1985, placing them into three composts. Two months later a rat ate most of the seedlings, leaving me with six plants. The first plant flowered in August, 1990 — one raceme of three flowers, although there were few flowers on the raceme the quality was apparent. I hybridised it with *D.* Hewitt Glow.

The second flowering was in late June, 1992 — two arching racemes of eight and 11 flowers. It was awarded an AM of 80.43 points on the 6th July, 1992 at Bankstown Orchid Society Meeting.

Dendrobium Tweed 'Big Mother' AM/NSW

Colin Brandon,
24 Tinakill Avenue, Engadine, N.S.W. 2233

I made the crossing of *D.* Tweed on the 10th September, 1977. The first plant flowered on the 12th July, 1981. The seedlings grew very well to start with, but due to a heat wave about 1982-83 they had a set back. A lot of the plants never recovered from the heat stress and damage, it was worse than frost bite.

The plants I used in the cross were a *D.* Peter, from M. Corrigan, one of his best and a *D.* Sunglow seedling from the Ira Butler collection. (*D.* Peter 'M.C.' X *D.* Sunglow 'Ira'). *D.* Tweed 'Big Mother' first flowered about five years ago, it has gained two grand champions at combined shows and an Award of Merit.

THE IRA BUTLER OUTSTANDING ACHIEVEMENT TROPHY PRESENTED TO SID BATCHELOR

Michael Harrison,
President, A.N.O.S. Sydney Group

The Ira Butler Outstanding Achievement Trophy has been awarded to Sid Batchelor. This trophy recognises significant contributions to the culture, breeding and advancement of Australian native orchid hybrids and is awarded at irregular intervals to nominees whose work is accepted as being of the highest order. Previous recipients include Wal Upton, Phil Spence and Roger Bedford.

Foundation Ira Butler Committee member Murray Corrigan made the presentation to Sid at the December meeting of A.N.O.S. Sydney Group Inc. He spoke about the many years of hard work and dedication Sid has put into his breeding programme and the numerous outstanding hybrids he has produced. As he presented the trophy, Murray said he can think of no more deserving a recipient than Sid Batchelor.

In accepting, Sid said he is more than pleased to have received the Ira Butler Outstanding Achievement Trophy. As opposed to other awards and trophies, which are granted to specific plants, the Ira Butler Outstanding Achievement Trophy recognises the long-term efforts and contributions of the breeder and Sid said he is greatly honoured to be a recipient.

The nomination on behalf of Sid Batchelor, presented to the Ira Butler Trophy Committee in October, 1992, is reproduced below. Its presentation was supported by the screening of over 50 slides demonstrating a number of Sid's breeding plants and many of the fine hybrids which have resulted from his breeding programme.

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NOMINATION FOR SID BATCHELOR TO RECEIVE THE IRA BUTLER ACHIEVEMENT AWARD FOR EXCELLENCE IN THE BREEDING OF AUSTRALIAN NATIVE ORCHID HYBRIDS

Sid Batchelor has been a dominant force in the breeding of Australian native orchid hybrids over the past 12–15 years. He has made major advances in the development of hybrid lines and the time has come for his work to be recognised by the awarding of the Ira Butler Achievement Trophy.

Sid Batchelor has been growing orchids for all of his adult life. For many years he grew Cymbidiums, but a serious back injury in 1960 made it difficult for him to work with them, due to their size and weight and he became increasingly interested in native orchids.

In 1963 Sid joined A.N.O.S. as a Foundation Member and he has been active and influential in the Society ever since. He is an A.N.O.S. Judge and he served two terms as A.N.O.S. Registrar of Judges, from 1988–1990. As a long-term member of A.N.O.S. Sydney Group he was awarded Life Membership in 1991.

Sid's interest in breeding with Australian native orchids began in the early 1970's. This has developed over the years to the point where Yondi Orchids is now recognised as one of the two or three top breeding nurseries for native orchids.

During his years as a breeder, Sid has worked with both species and hybrids. Not only has he produced some of the finest native orchid hybrids to date, he has also done considerable work in the selective breeding of certain species orchids, most notably *Dendrobium tetragonum* and *D. kingianum*.

Sid has built an impressive collection of stock plants and he has used these carefully and with considerable forethought, to produce a distinctive, high quality line of species outcrosses and hybrids. Such breeding plants as *D.* Star of Gold 'Bathurst', *D.* Peachglow 'Brolga', *D.* Ellen 'Boobyalla', *D.* Ellen 'Deloraine', *D.* Jamie Upton 'Goldie', *D.* Peter 'Citron', *D.* Yondi 'Ruby', *D.* Aussie Bonanza 'Tammy', *D.* X *delicatum* 'Tracy', *D. kingianum* 'Betty' and *D. tetragonum* 'Yondi No. 1' are well known amongst native orchid enthusiasts as superior breeding plants with proven potential.

One of the keys to Sid's success as a breeder has been to select parent plants which are strong growers. He feels that regardless of flower quality, if a plant is difficult or temperamental to cultivate, then such characteristics are best avoided and eliminated from breeding lines. As a consequence, Sid has a reputation for producing plants that are not only of the highest quality, but which are also easy to grow.

His approach to breeding involves much more than simply crossing two plants because they happen to be in flower at the same time. He generally has an idea of what he wants to achieve and he works towards a specific goal by carefully selecting the parent plants to be used. Usually thinking at least twelve months in advance, Sid already has a good idea of which crosses he will be making next year and the year after.

One of Sid's earliest successes came from crossing *D. kingianum* 'Betty' with *D. tetragonum* 'Yondi No. 1'* in the mid 1970's. This produced a distinctive line of *D.* Ellen, with purple-blotched flowers with solid pink labellums. Such clones as *D.* Ellen 'Boobyalla', *D.* Ellen 'Corinna' and *D.*Ellen 'Deloraine' are examples of plants from this cross. They have been used extensively by Sid in subsequent breeding and are still used today.

D. Yondi (*D. kingianum* X *D.* Eureka) was another very popular hybrid made by Sid in the early 1980's and it produced very floriferous plants with widely opening flowers in pinks and purples. *D.* Yondi 'Ruby', *D.* Yondi 'Kelso' and *D.* Yondi 'Dip Falls' are well known clones here.

Sid is probably best known for his line of hybrids featuring star-shaped flowers in brilliant yellows, bronzes and oranges. Much of the success here can be attributed to two plants: *D.* Star of Gold 'Bathurst' and *D. tetragonum* 'Yondi No. 1', both of which came originally from Noel Jupp in the early 1970's. Jupp's Nursery was the source of quite a number of Sid's early breeding plants and Sid maintains that Noel Jupp's contributions to native orchid hybridising have not been fully appreciated.

Sid's now famous "red-lip" line of *D.* Hilda Poxon (made using his *D. tetragonum* 'Yondi No. 1'), is widely recognised as a classic; these plants are much sought after and have won many shows. One of these, *D.* Hilda Poxon 'Bellingen', was recently awarded by O.S.N.S.W. Also, his remake of *D.* Star of Riverdene, using *D.* Star of Gold 'Bathurst' and *D. speciosum* var. *pedunculatum* 'Yondi Cream No. 1' has produced a number of show champions. Other outstanding hybrids made or remade by Sid in this style include *D.* Tarean (*D.* Star of Gold X *D.* Hilda Poxon), *D.* Yondi Pioneer (*D.* Aussie Bonanza X *D.* Star of Gold), *D.* Yondi Star (*D.* Ellen X *D.* Ira's Star) and *D.* Jamie Upton X *D.* Star of Gold.

Sid has also worked extensively with *D.* Peach Glow 'Brolga' to produce a line of hybrids with more or less round, filled-in flowers of very heavy substance. The special beauty of these hybrids is in their colours, which are generally lovely suffused pinks, peaches and apricots. Such hybrids as *D.* Yondi Brolga (*D. kingianum* X *D.* Peach Glow) and *D.* Yondi Glow (*D.* Hilda Poxon X *D.* Peach Glow) are examples of this style.

And, of course, Sid continues to work. One of his most recent successes was *D.* Elegant Sunset (*D.* Suzanne X *D.* Star of Gold), plants of which have been flowering for the first time this year. The results have been outstanding, with an incredible colour range from bronze/orange, through yellow to cream and one notable plant with a pure white flower and a full pink lip.

There can be no doubt that Sid Batchelor has been and continues to be responsible for some of the finest Australian native orchid hybrids. He is certainly deserving of the Ira Butler Achievement Award.

* *D. tetragonum* 'Yondi No. 1' originated as a seedling of an outcross between two clones of *D. tetragonum* var. *giganteum*, known as 'Barker's Variety' and 'Kennedy's Variety', made by Noel Jupp. Each of these clones had flowers with fully suffused pink labellumns, and this feature was carried through into *D. tetragonum* 'Yondi No. 1' and subsequently, into hybrids made using this plant.

THE *PLECTORRHIZA* SPECIES

Roy Gifford,
2 Warrah Street, Ettalong, N.S.W. 2257

The genus *Plectorrhiza* was created by Alick Dockrill in 1967 to accommodate three species of Australian Sarcanthids which had puzzled taxonomists of earlier times, all three had been placed in other genera previously. See references for synonymy.

All are endemic to Australia, two restricted to the east coastal ranges and one to Lord Howe Island.

They all have long slender stems, with many adventitious roots and all prefer much the same habitat, i.e. cool shady areas of fairly high humidity. *P. tridentata* has the southernmost range, being found in almost any shady moist forest from north-eastern Victoria to well up the Queensland coast, provided such forests are exposed to constant breezes. *P. brevilabris* (see rear cover) grows in nature from south-eastern Queensland up to at least the McIlwraith Range of south Cape York Peninsula. David Jones gives its southern boundary as the Noosa River, but I would be a little picky and extend the range a bit further south, for I found it in the foothills of the Blackall Ranges in the '50's, from Caboolture north. It grows there often in association with *P. tridentata,* though the latter extended further up the gullies.

Our third species *P. erecta,* grows in nature only on Lord Howe Island and as its name suggests, has an upright habit of growth — unlike its brothers which are both pendulous. I have only ever seen one plant of *P. erecta* — one grown by the late Charlie Taylor, who kindly gave me a side growth, he told me he had started with a growth given to him many years earlier. Apparently the original plant came to the mainland about the turn of the century and had been passed from grower to grower via side shoots. *P. erecta* is one Australian miniature which should definitely be propagated by seed, for its natural habitat is very restricted and it faces a very uncertain future if vegetative multiplication is its only hope. To lose any species to extinction is abhorrent, especially when flask babies are so easy to the current crop of breeders in Australia.

P. tridentata is the species most commonly seen in collections in eastern temperate Australia, mainly because this area covers its natural range, it is very common in the forest and it grows very well and blooms consistently with very little effort required by the grower. Strap a plant to a slab of some kind — I found a length of old weathered hardwood fence paling was very good — hang it in a shady corner of the bushhouse (about 70% shade), which is open to breezes, water and feed regularly and the plant will respond by growing well. Healthy plants soon throw out side growths and in a few years one has a large, rather untidy plant which will produce at least two racemes of blooms on every stem and perfume the bushhouse for months. Plants become untidy due to their habit of producing large numbers of adventitious roots, which just wander about — though like most Sarcanthids they will eagerly grab any suitable surface they encourter and also dive into the medium of any pot within reach. If one deliberately puts their roots into a potting medium, they will die in almost every case. They are very fussy about free will as regards where they send their roots.

In nature they prefer twiggy hosts and if growing on large trees, will invariably be found hanging by a couple of roots to thin branches on the outer canopy. This habit results in a high mortality rate among youngish plants, their host twigs often die and break, in many good growing areas many orchid plants are found on the ground, where they do not live long. In such cases, if one is so inclined, lives may be saved easily, for one can use a couple of the plant's roots to tie it back on to a more substantial twig, where plants will happily carry on growing. The blooms of *P. tridentata* are carried on simple short racemes which emerge from eyes opposite leaf bases and carry up to eight blooms a centimetre or so across. They open widely, with shapely sepals and petals bluntly pointed. Sepals and petals are usually dark chocolate brown, though plants with paler segments are not uncommon, I have seen flowers with beautiful lime green sepals and petals. The labellum, with widely spreading side lobes, is always white with a small green spot at the base. The spur is slightly curved, but carried almost parallel to the ovary, a distinguishing feature if confused with the blooms of *P. brevilabris,* whose blooms have the spur projecting downwards, almost at right angles to the ovary. Like its brothers, the blooms of *P. tridentata* are modest and unassuming in colour, but they are almost brazen in their perfume, for they are amongst the most fragrant of flowers. To sit in a rainforest gully on a warm still day in late spring is to experience an olfactory feast if one has picked the right gully, for these plants are abundant and produce lots of blooms, every breath is filled with a delightful perfume, sweet but not cloying as some can be and the perfect adjunct to a cup of billy tea.

P. brevilabris occupies much of the same geographical range in Queensland as *P. tridentata,* the species overlapping along most of eastern Queensland, but in my experience, in the south *P. brevilabris* is restricted to lower altitudes, while in the north *P. brevilabris* climbs much higher and does not seem to be really happy in the tropics, plants I have seen in northern forests are never as large or healthy as southern plants and seem to loose their leaves much more quickly. Plants of *P. brevilabris* can be confused with *P. tridentata,* especially southern forms, but the leaves are broader on *P. brevilabris* and the latter rarely forms such large clumps as does *P. tridentata.* Maybe my imagination, but I think the roots are thicker in *P. brevilabris* also. Plants in bloom are easy — just look at the spur if at all confused, for the spur on *P. brevilabris,* while slightly hooked at the apex, points firmly at the ground, i.e., at right angles to the column. As explained earlier, spurs on *P. tridentata* are parallel to the column.

In cultivation I found *P. brevilabris* grew quite well on a slab beside *P. tridentata* in the bushhouse, but plants from north Queensland were much slower and those I eventually put in the coolest part of the warm house, near a fan. Racemes carry up to 15 widely opening blooms about a centimetre across, with narrow segments. Colour does not seem to vary much, all plants I have seen having sepals and petals of some shade of green, with a dull red splotch about half way along the segment. The lip is very small, green and white, the green usually brighter than general flower colour.

Blooms are nicely perfumed, but to my nose, not as sweet as *P. tridentata.* Harder to grow into a specimen than is *P. tridentata, P. brevilabris* nevertheless is not difficult to grow and flower and takes little room in the orchid house. Worth growing for its perfume if nothing else.

I know very little about *P. erecta,* never having seen it in nature and having grown only one clone, but it is the neatest of the three, growing upright and more or less keeping its wandering roots to itself.

David Jones notes that plants on Lord Howe Island grow in low scrub close to the coast, which would lead me to think that it would grow much better in temperate areas with a little heat, but when I had a plant to spare and tried it in a warm house, it languished, so I put in back in the bushhouse. Maybe my plant, whose vegetative forebears had been growing in Sydney bushhouses for about 60 years before I got it, had become used to the climate of coastal central N.S.W. Having no experience to fall back on, I grew the plant as I saw it grown, in a pot of largish lumps of bark, with a column of Iron Bark to climb up. It was placed in the south-west corner of my house, which had solid walls on the south and west, got about 70% shade and was exposed to any breeze from north and east. I watered heavily during warm weather and fed regularly with weak nutrients, mostly organic and the wee side growth I started with soon became the proud centre of a small forest of growths. I used to cover that area of the bushhouse with fibreglass in winter to keep rain off resting plants, so the *P. erecta* got watered in winter when I remembered it, sometimes once a week, sometimes less often, but it seemed to like it. After a year or so I could not move it, I had wooden benches in those days and the roots took to those hardwood benches with a will and ran quite a distance. It became quite a neat and attractive plant with bright green fleshy leaves, the white adventitious roots providing quite a contrast.

I had the plant for 23 years and by then the original stem was about 50cm high. This is not a species whose blooms drive you mad with longing, the racemes are short, less than 50mm, quite thick and stiff, protruding at right angles from stem eyes opposite leaf bases, carrying 3–4 cuppy blooms about 6mm across. Sepals and petals are thick and fleshy, dull yellow outside, muddy red inside. The fleshy, hairy labellum is white and projects forward, the spur very short and broad, bluntly rounded. Perfume is weak compared to other species. With me, the plants bloomed for a short period, a couple of weeks each side of Christmas. A very neat little species which is worth growing for the plant alone, it should also be esteemed for its rarity.

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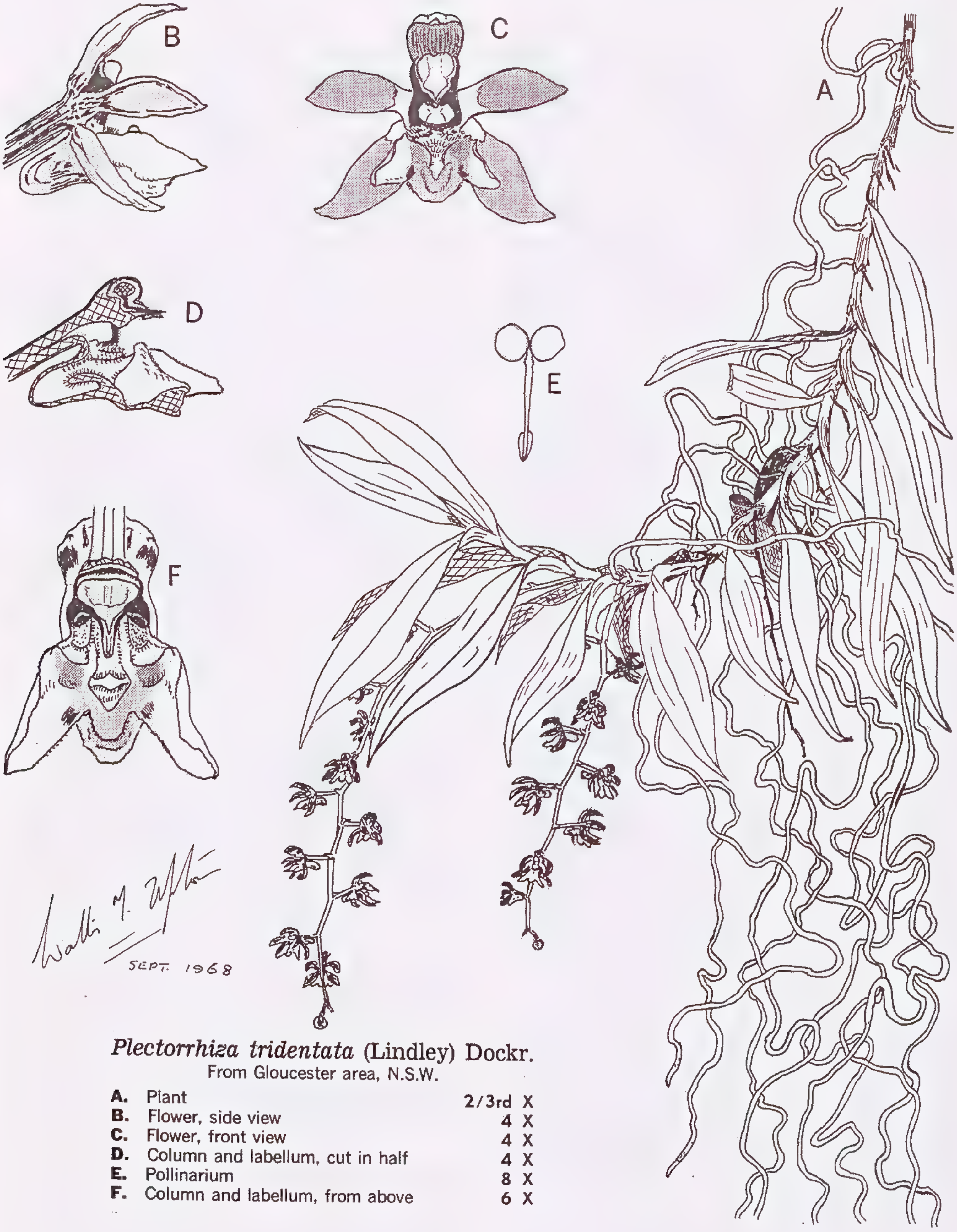
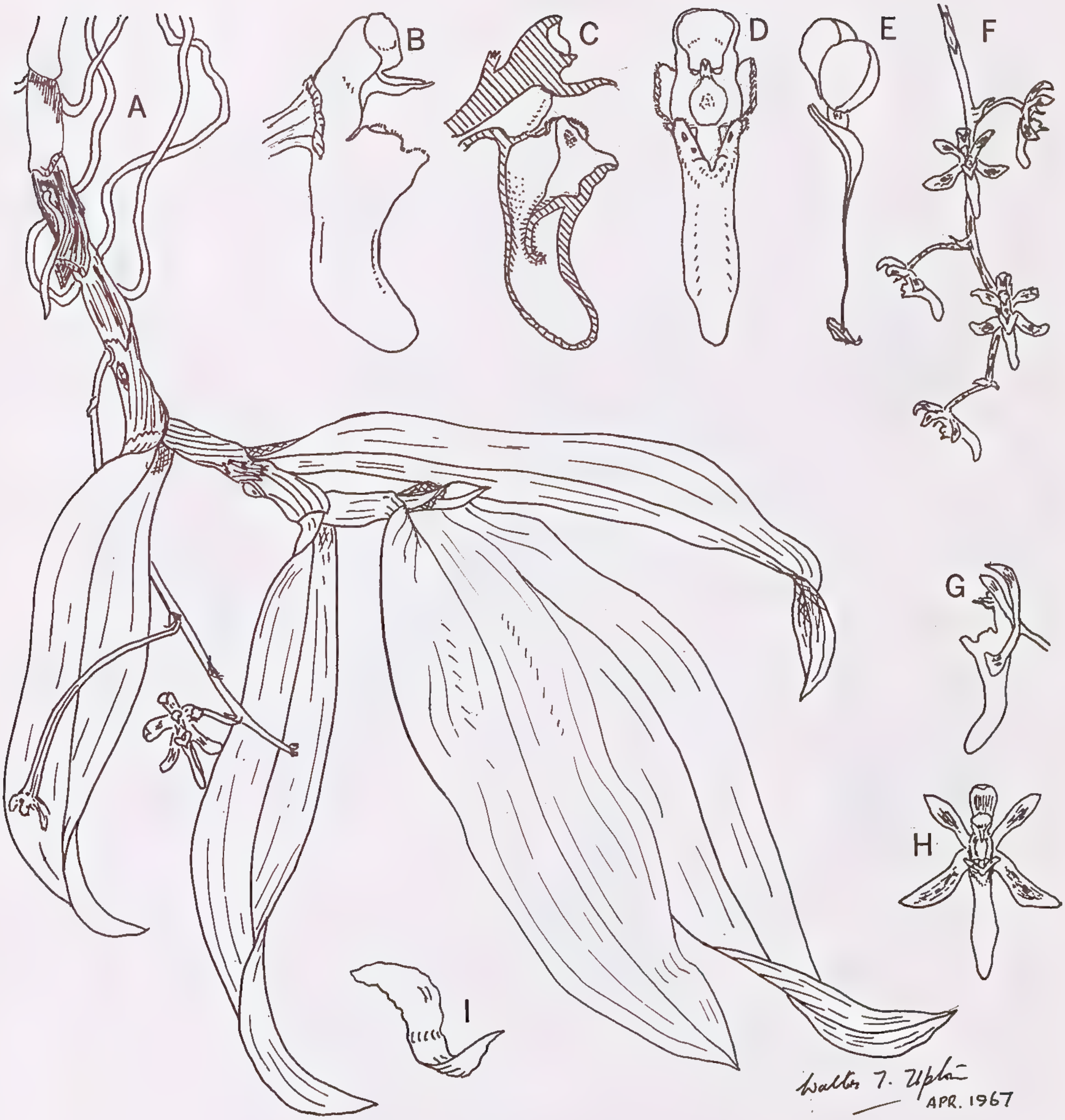


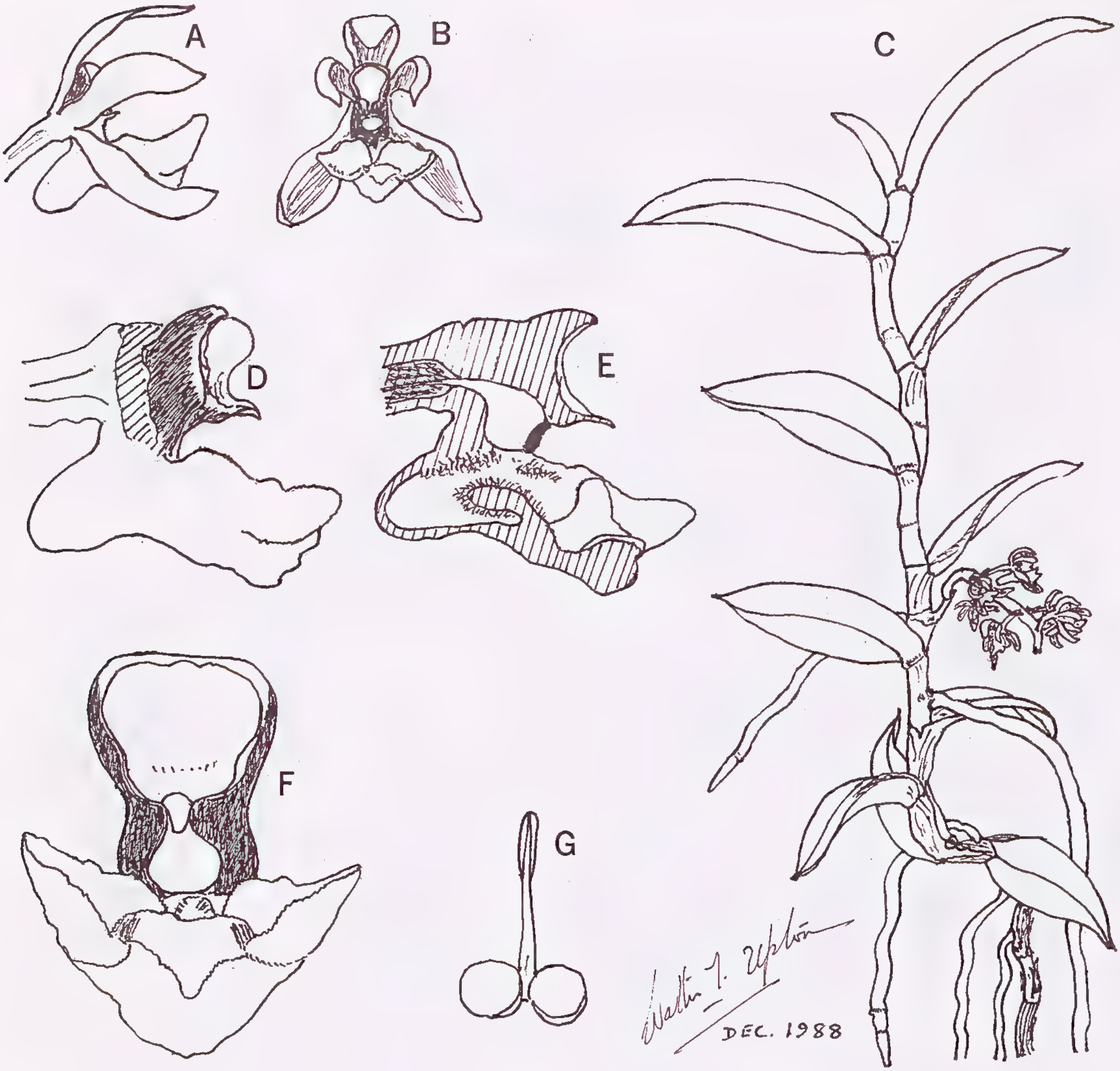
Plectorrhiza tridentata (Lindley) Dockr.
From Gloucester area, N.S.W.

A.	Plant	2/3rd X
B.	Flower, side view	4 X
C.	Flower, front view	4 X
D.	Column and labellum, cut in half	4 X
E.	Pollinarium	8 X
F.	Column and labellum, from above	6 X



Plectorrhiza brevilabris (F. Muell.) Dockr.

A.	Plant	1 X
B.	Column and labellum, side view	4 X
C.	Column and labellum, cut in half	4 X
D.	Column and labellum, front view	4 X
E.	Pollinarium	12 X
F.	Raceme	1 X
G.	Flower, side view	2 X
H.	Flower, front view	2 X
I.	Anther cap	8 X



Walter T. Upton
DEC. 1988

Plectorrhiza erecta (Fitzg.) Dockr.

From Mount Lidgbird, Lord Howe Island

A.	Flower, side view	4 X
B.	Flower, front view	4 X
C.	Plant	1 X
D.	Column and labellum, side view	8 X
E.	Column and labellum, cut in half	8 X
F.	Column and labellum, front view	12 X
G.	Pollinarium	12 X

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 8: *Chiloglottis* X *pescottiana* R. Rogers

Common Name: Bronze bird orchid

Subfamily: Orchidoideae
Tribe: Diurideae
Subtribe: Caladeniinae
Genus: *Chiloglottis* R. Brown

Distribution: *Chiloglottis* is restricted to Australia and New Zealand. *C.* X *pescottiana* can be found in south-east N.S.W. to north-east Victoria, where both parents occur together.

Notes: Plants of the genus *Chiloglottis* are distinctive with two basal elliptical leaves and a flowering stem which has a single flower. The flowers are relatively inconspicuous with the majority of the flower a dull green or red-brown colour. The conspicuous feature of the flower is the lamina calli of the labellum which maybe developed to the point of resembling an insect. The column is curved, which is typical of the subtribe and overhangs the labellum. The column has two distinct column wings which can often project terminally as well as laterally. *Chiloglottis* X *pescottiana* is a natural hybrid between *C. gunnii* and *C. trapeziformis.* This orchid exhibits characters intermediate between the two parents.

Pollination: There has not been a pollinator reported for this natural hybrid, but both parents, *C. gunnii* and *C. trapeziformis,* are pollinated by male thynnid wasps. The male thynnid wasps are deceitfully attracted to the flowers of the parent species, expecting to find a female wasp. Pollination occurs when the wasp attempts to copulate with the flower.

Conservation status: Neither this orchid or its parents are listed as under threat.

Culture: This orchid can be grown in a basic terrestrial orchid mix under 50% shade.

Illustration: Painting: Illustrated are a number of plants of *C.* X *pescottiana,* note the single flowers on each plant and the two basal leaves. Drawing: Illustrated at the base of the page are views of the flowering plants from different angles: (a) flower from the side showing the calli on the labellum; (b) column from the side showing the distinctive curvature of the subtribe; (c) an oblique front view of the column, showing the column wings surrounding the stigma and anther; (d) front view of the column, showing the stigma, rostellum, anther and the pollinia.

Description: Tony Slater, 159a Raleigh Street, Thornbury, Victoria 3071.
Illustration: Helene Wild, 56 Civic Parade, Seaholme, Victoria 3018.
Floral material was kindly donated by Helen Richards and Malcolm Thomas.

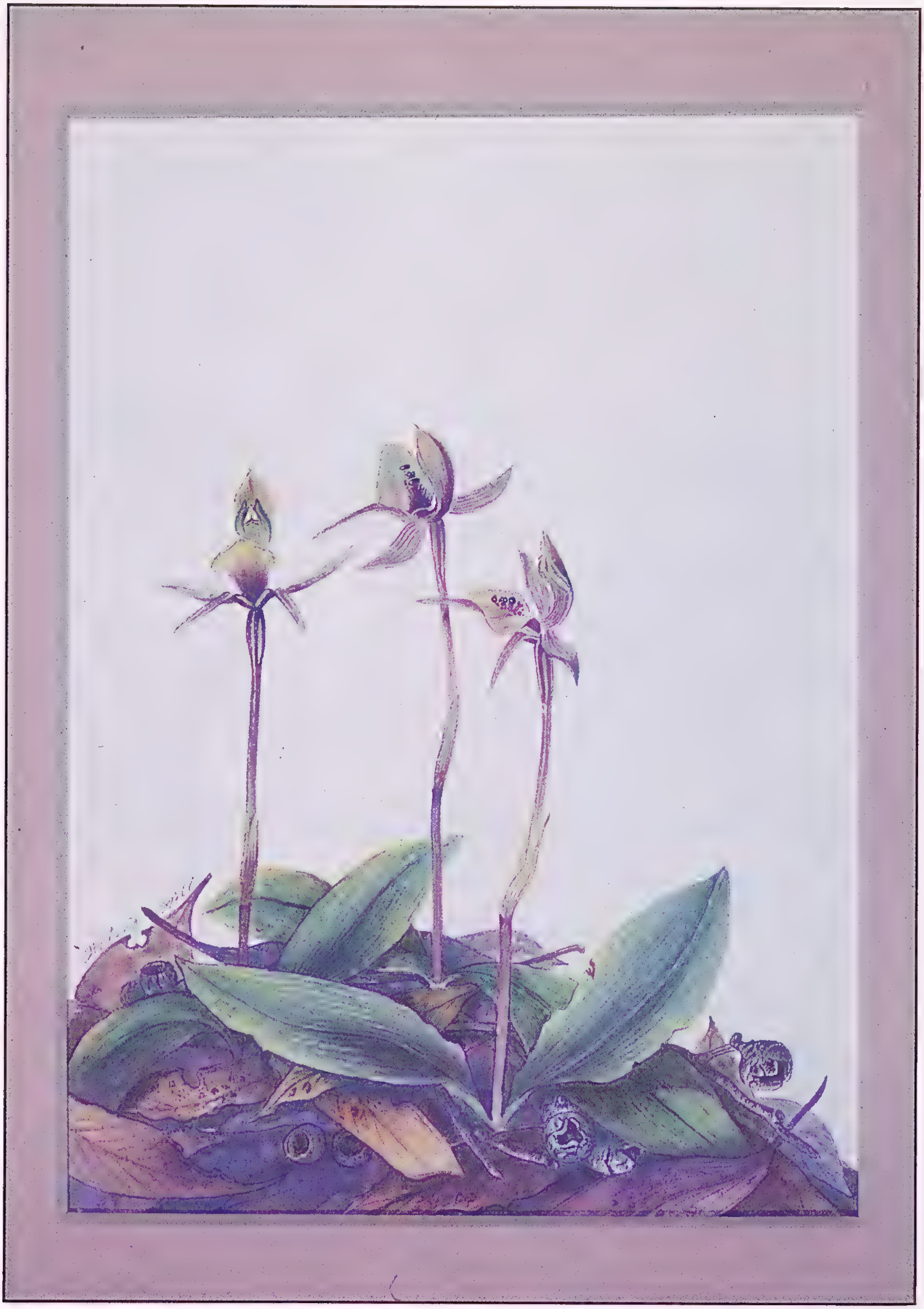


Plate 28: *Chiloglottis* X *pescottiana* Rogers. From a painting by Helene Wild.

Chiloglottis X *pescottiana*

R. Rogers

Fig. A

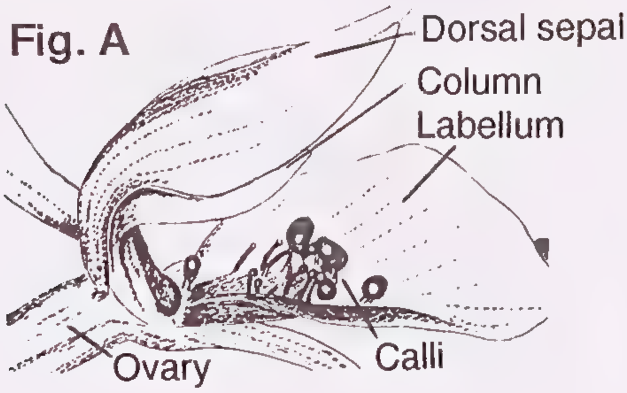


Fig. B

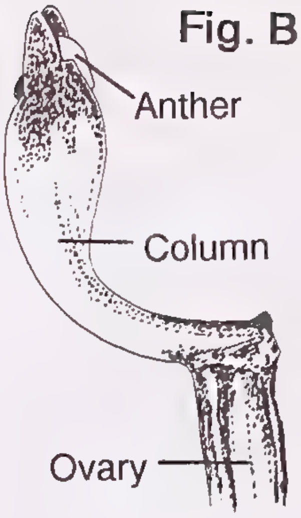


Fig. C

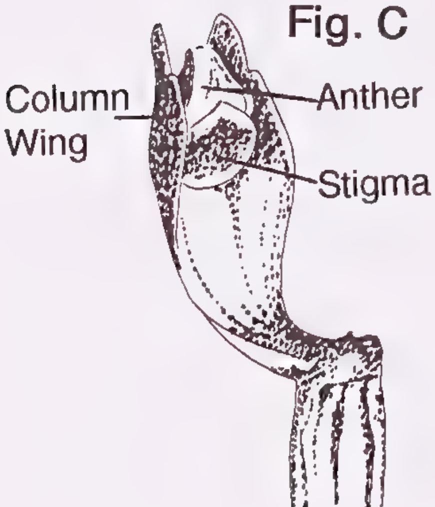
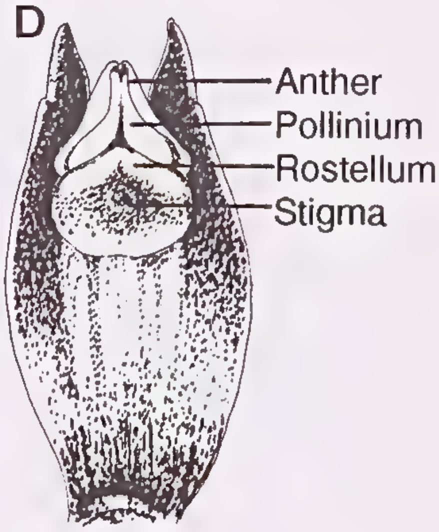
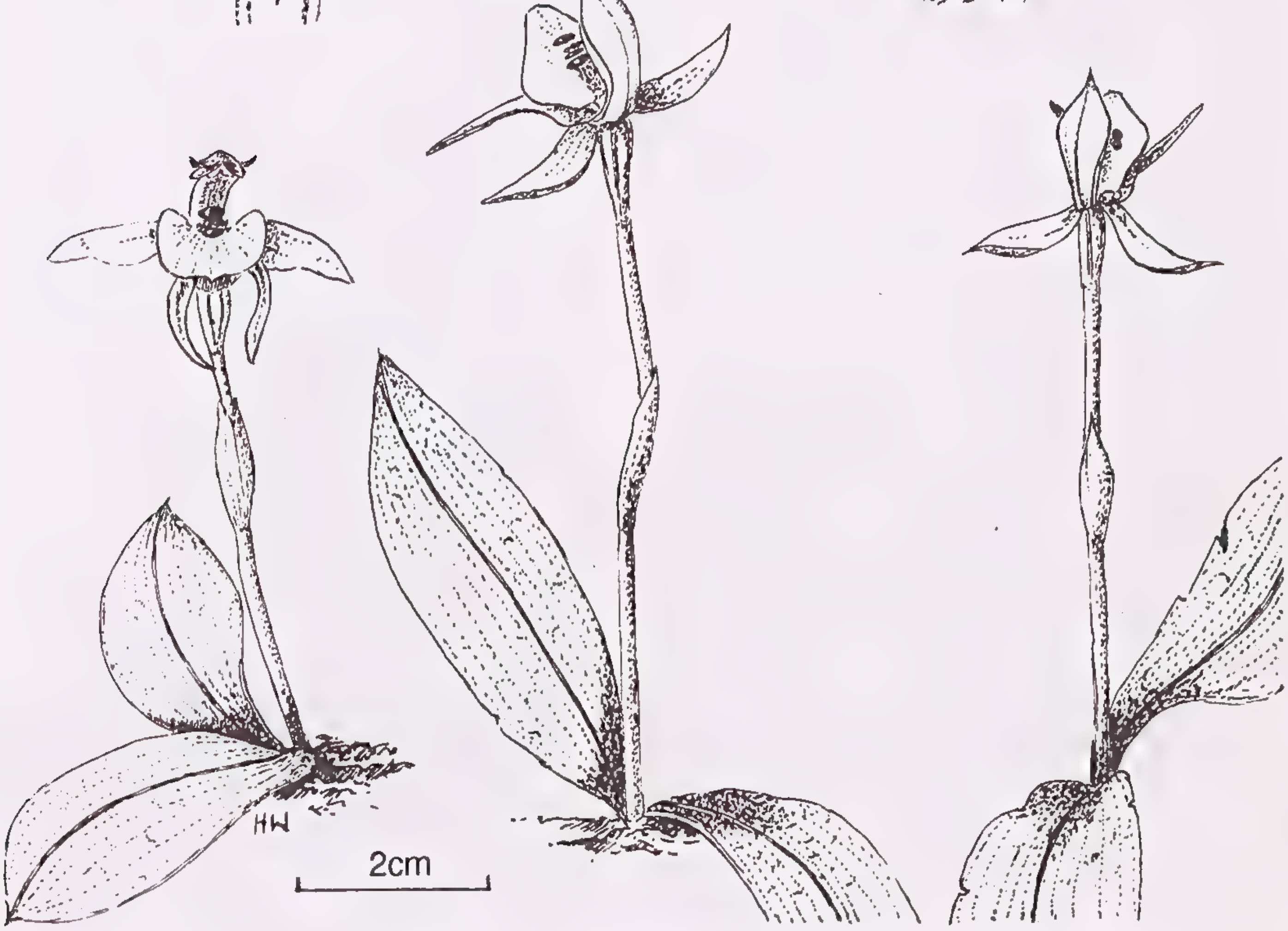


Fig. D





A NEW A.N.O.S. GROUP IN THE HAWKESBURY DISTRICT

Gordon D. Franklin,
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Late in 1990 a small group of staff and students from the Horticulture Faculty of the University of Western Sydney — Hawkesbury Campus (formally Hawkesbury Agricultural College) put out feelers to see if there was sufficient interest in forming an A.N.O.S. Group in the Hawkesbury area. The geographic centre is the township of Richmond, about 60km to the west of Sydney at the foothills of the Blue Mountains and a Group here would fill a void and complete the coverage of the Sydney area as far as A.N.O.S. Groups are concerned.

Our inaugural meeting in February, 1991, saw a good turnout, for word had spread that a new Group had formed. That meeting saw our aims and objectives discussed, the concept being to increase the awareness, understanding and appreciation of native orchids in the natural environment through education.

The March meeting saw a discussion on a title for our newsletter and after much recounting of the life and times of a much overlooked botanist, particularly in regard to his work on the orchids of the Sydney area between 1800–1810, it was agreed by all that the Hawkesbury Group newsletter be titled "CALEYA", after George Caley (1770–1829). It was also suggested that at some future time a seminar be conducted on the life and works of Caley. A Group badge design was also submitted and approved by all. It would be similar to the design on our letterhead and would depict *Diuris punctata,* the colour scheme being white background, purple flower with green laterals and gold lettering.

A.N.O.S. Hawkesbury Group has commenced work on the R. D. FitzGerald Collection, a living collection of native orchids to be held at the University's Horticulture Faculty. This collection will contain native species and natural hybrids for which exact location details are known. A second collection, to be known as the Sid Batchelor Collection, will contain other orchid plants for which there are no location details. Sid Batchelor has been in the forefront of improving the quality of both native species and hybrids for many years and has thus reduced the pressure from orchids in the wild. Sid has also been very generous to the new Group and has been very supportive of our efforts.

We are fortunate in having another member working in this direction as well. This is Michael Harrison, who, together with his wife Roslyn, is following in Sid's footsteps in the breeding and propagation of native species and hybrids. As more people follow these examples the strength of A.N.O.S. increases.

The University held its Annual Open Day on 18th August, 1991 and some 13,000 people took advantage of the excellent weather to join in the celebrations for the College's Centenary Year. From the Group's point of view the day was very successful. Our members put on an excellent display of native orchids, attracting a large audience. Their favourable comments and willingness to purchase plants was further proof that interest in native orchids continues to grow.

August also saw Dr Joan Webb give a most informative talk at our monthly meeting on the life and works of George Caley, the 19th century naturalist. Dr Webb explained that Caley, a Yorkshireman of humble origins, worked in New South Wales from 1800 to 1810 as a collector for Sir Joseph Banks. He lived at Parramatta and his quest for plants took him on many field trips. In November, 1804 he crossed the Hawkesbury River and penetrated the previously unexplored Blue Mountains, to the west of Sydney, eventually reaching and naming Mt Banks. Dr Webb said it is almost certain Caley later discussed his travels with William Lawson, one of the party that eventually crossed the Blue Mountains in 1813. She said that Caley seldom receives any credit for his explorations.

A.N.O.S. Hawkesbury Group has held several field trips, the first to the proposed Londonderry Tip site. It was decided to investigate four locations in this area for habitat suitability. It was felt these sites would provide an adequate assessment of their vegetation associations and would also give us an idea of what terrestrial orchid species may be present. Another field trip took place on Saturday, 14th September, 1991, under the name "Bligh Park Revisited". The aim of this trip was to observe those orchids that survived the decimation by housing development and associated roadworks at South Windsor, an expanding north-western suburb of Sydney. A small group of Hawkesbury members met at a prearranged location. Despite the very dry condition of the ground several taxa were seen, although many are under threat from weed incursion, altered hydrology, 4WD activities and rubbish dumping. It was particularly surprising to see large numbers of caladenias flowering under such harsh conditions. Orchids seen included *Diuris maculata, Pterostylis mutica, P. nutans, Thelymitra* sp., and on some dry stony ground there were hundreds of *Caladenia catenata* mixed with some particularly colourful *C. carnea.* Also found were plants of *Calochilus robertsonii* just coming into flower, as well as several large flowering plants of *Pterostylis bicolor.* The trip ended with all of us satisfied with what we had seen and photographed and left us surprised at the resilience of our local orchids in the ever persistent face of adversity.

Our Christmas meeting brought to an end our Group's first year and what a finale it was. With a very good roll-up of members and guests and plenty of time for them to enjoy a delicious supper, I'm sure everyone enjoyed themselves. Our "Orchid Grower's Hamper" was a huge success. With yet another flask from Sid Batchelor, a compot of *Sarcochilus ceciliae* from our Honorary Secretary, a bag of bark, some bark treatment, some native seedlings, a framed native orchid picture and a bottle of bubbly to name just a few contributions, it just kept growing in size. Everyone supported it well.

A.N.O.S. Hawkesbury Group does not hold a January meeting, mainly because of the semester break, so the first meeting of 1992 was the A.G.M. in February. This meeting saw the rearrangement of the Committee, with a shuffle of positions and the appearance of one new face. After all that A.G.M. stuff had been completed, members enjoyed a most interesting talk given by Tony Curry from the Botanic Gardens at Mt Tomah. Tony gave us an excellent insight into how these gardens came to be the magnificent place they are today. He showed us slides of the various stages in their construction and also took us on a photographic tour of the many overseas locations from which plants had been obtained for the gardens. Members thoroughly enjoyed Tony's talk and afterwards presented him with a native orchid in a pot for his time and effort.

On 12th April the Group held a family outing at Mt Tomah Botanic Gardens. We could not have chosen a more perfect day; the weather was superb. A good number of members attended and all enjoyed themselves. We wanted to have a look at a spot where we have been given permission to establish and maintain a terrestrial orchid garden, in conjunction with the Mt Tomah staff. A number of terrestrial species were found growing naturally and one *Chiloglottis* species was seen in flower. As we left I'm certain all of us were looking forward to our next visit.

We have some really keen members in our Group, including several who don't mind getting out into the bush. One such member has undertaken the mapping of the vegetation of the Kowmung area. Just where is the Kowmung? Well, as Hawkesbury Group member Greg Steenbeeke says: "This is a common question I hear when I tell people what I will be doing over the weekend". Greg explains: "The Kowmung can best be described as the dirty great hole in the ground south of Kanangra Walls and it is a part of the catchment area of Lake Burragorang, the lake formed by Warragamba Dam". Greg says: "I undertook mapping the vegetation of the area in 1990 as my Honours Project and in doing this project I was looking at the plant species that were present and using them to determine the range of vegetation types. However, like most of we poor creatures that have been bitten by the orchid bug, I ended up taking a special interest in the orchids to be found in the area. I still regularly visit the area to obtain field data for my Masters Project, which has evolved as a natural spin-off from my Honours. For some reason though, it has to do with a *Hakea* species". Greg Steenbeeke was guest speaker at our September, 1992 meeting and he explained about all the work he has been doing.

The Annual Open Day for 1992 was held on 16th August and A.N.O.S. Hawkesbury Group was there again. The Group had about the same display area as in 1991, only this time it was in the new plastic igloo house, not our usual meeting room. We were intending to put on a great display of Australasian orchids, to at least equal last year's efforts and with the support of our members it turned out to be a fantastic display. The weather was warm and luckily the information table to which I had been assigned was near the entrance, so I could take advantage of the cooling breeze. AS you can imagine, it got rather hot inside the igloo!

To finish off this "novel", please accept an invitation to one of our meetings. We are a friendly lot. We meet at 8.00 p.m. on the first Friday of each month (except January) in Seminar Room S46, Faculty of Horticulture, University of Western Sydney — Hawkesbury Campus, Richmond. Enter from Londonderry Road.

A GOOD EXCUSE TO OPEN A BOTTLE OF SHIRAZ

Bob Napier,
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Caringbah, N.S.W. 2229

It must have been four or five years ago, when Peter Leithhead left sunny Gymea for the frozen slopes of Mount Gibraltar and donated his collection of epiphytic native orchids to A.N.O.S. Port Hacking Group, that I came into possession of his *Dendrobium lichenastrum* (see Plate 31). Incidently the hole at 9 o'clock is the result of the removal of a portion for transplanting and inspection of the mount.

Peter had shown us this plant several years earlier, he had glued wine corks, cut lengthwise, to a piece of weathered hardwood paling and affixed the *D. lichenastrum* with nylon fishing line. Members of the Group indulged his seeming eccentricity, duly admired the plant (it wasn't dying) and forgot all about it.

I also forgot the plant after buying it and tucking it away in a shady corner of the shadehouse, intending to remount it . . . eventually (you know how it is).

It thrived so well on neglect, the corks showing no sign of deterioration or insect attack after a total of six or so years, that a retrial of Peter's idea was felt warranted.

Corks were cut in half lengthwise, glued to pieces of weathered hardwood paling; some mounts with the water-based Selley's Supa Nails and others with Araldite (five minute curing variety). The Supa Nails seems better with the more weathered board, some species with strong roots tend to lift the corks if Araldite is used.

Plate No. 32 shows a *D. lichenastrum* tied and Araldited to a mount where Supa Nails was used to fix the corks, though not obvious in the slide, roots have penetrated the interstices between the corks and the plant after six months is on its way.

I know that wine corks are treated, but I did not expect such lasting qualities, compressed cork blocks and natural cork mounts of similar age have deteriorated entailing remounting with consequent stressing of the plants.

Small pieces of *D. pugioniforme* initially appear to take to the wine corks in preference to hardwood, but, once attached to the cork are quite happy to send their roots onto the hardwood base, raising the possibility of using a small cork area, say 10cm x 20cm, on a full paling for those species needing a long root run.

As a incidental to this trial, I have been experimenting with various adhesives as a means of fixing plants to mounts. Selley's Liquid Nails is too messy and the solvent could be harmful to the plant, the similar Supa Nails with a water cleanup is better and quite suitable for rough-surfaced mounts, e.g. ironbark totems or, as at my daughter's home, sandstone rock faces where both *D. striolatum* and *D. linguiforme* are starting to grow after this treatment.

The use of the following adhesives was rejected either because of water-solubility after setting or possible harmful effects on plants: contact cements, PVA glues, any adhesive using a volatile solvent, casein glue (is it still made?), heat setting glues; although next time I have a water-based silicone sealer on the go it will get a trial, however the effect of a plant held to its mount with a white glob of sealer may rule this out on aesthetic grounds.

The advantages of using Araldite rather than Supa Nails for fixing the plant to the mount (rather than the corks to the wood) are quick curing, five minutes as against 24 hours and invisibility — it dries clear. Neither adhesive seems to have any adverse effect on the plants' pseudobulbs, leaves or roots. Roots of *D. linguiforme* and *D. aemulum* have continued to grow after being stuck down with Araldite and Supa Nails respectively and *D. pugioniforme* has been glued by rhizomes, leaves and roots to both cork and hardwood with Araldite with no apparent ill effects. Plate No. 33 shows *D. aemulum* fixed to an ironbark totem using Supa Nails, after a little over a year, root growth is quite evident. *Bulbophyllum shepherdii* Araldited to hardwood for about six months, showed good root activity.

Sounds good, but I think all I've done is create a problem, how do I get more corks and not a hangover?

A THOUGHT FOR THE GROWING MEDIA

Bacteria live in the growing media with our orchid plants. An adequate amount of plant food, to feed both plant and bacteria, is therefore essential, otherwise the bacteria will monopolise the food supply.

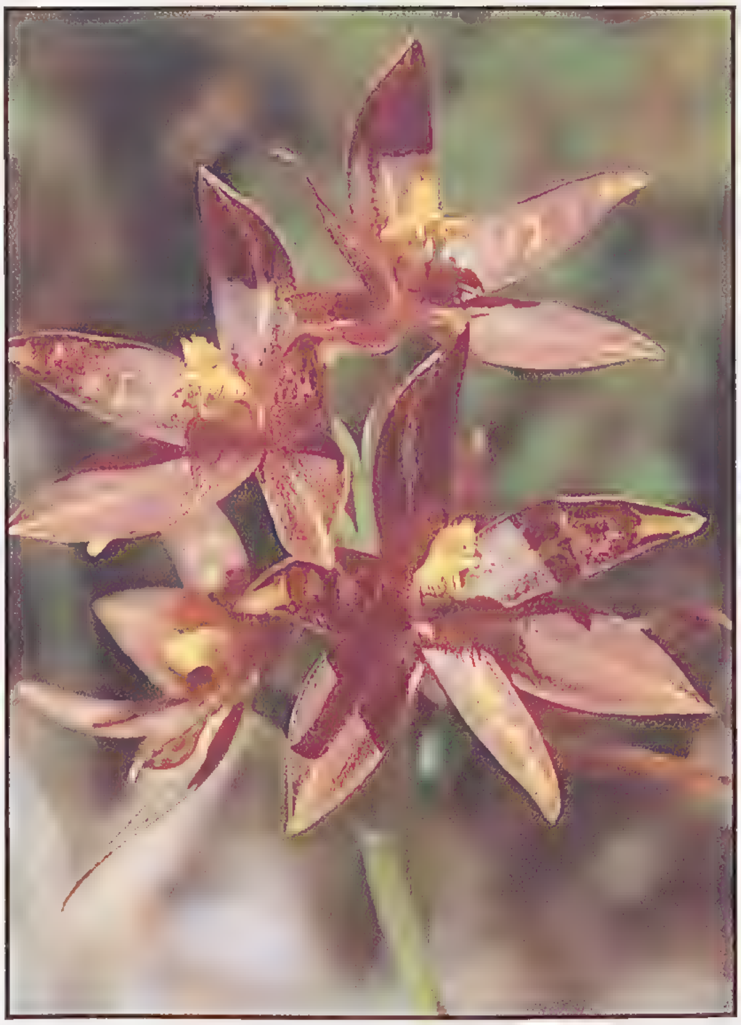

Plate 29: *Thelymitra* species. Photo: A. Brown.

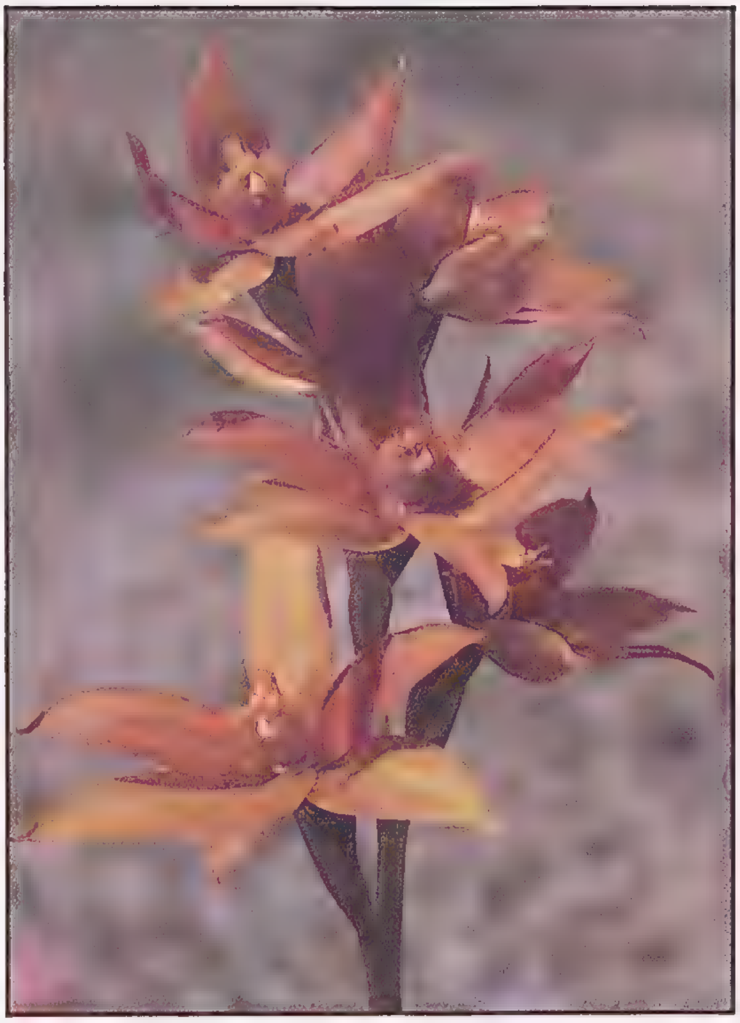

Plate 30: *Thelymitra dedmaniae.* Photo: A. Brown.

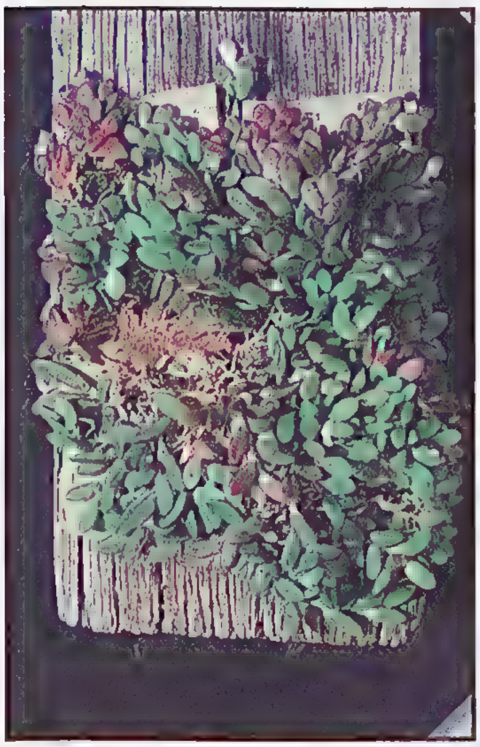

Plate 31: *Dendrobium lichenastrum* on wine corks. Photo: R. Napier.

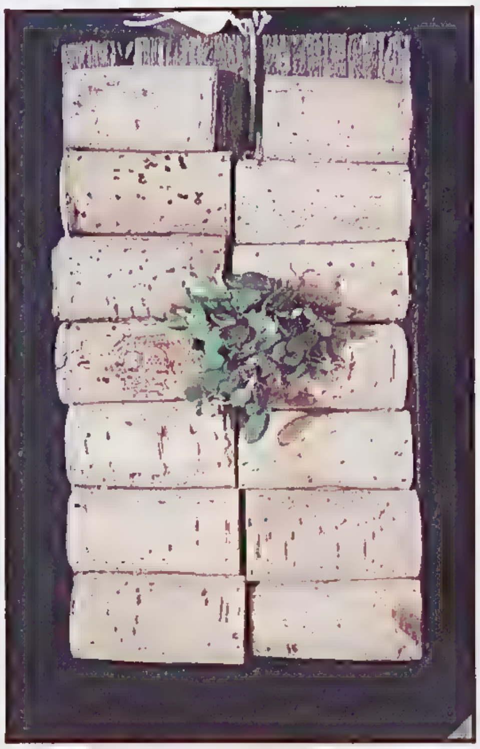

Plate 32: *Dendrobium lichenastrum* on wine corks. Photo: R. Napier.

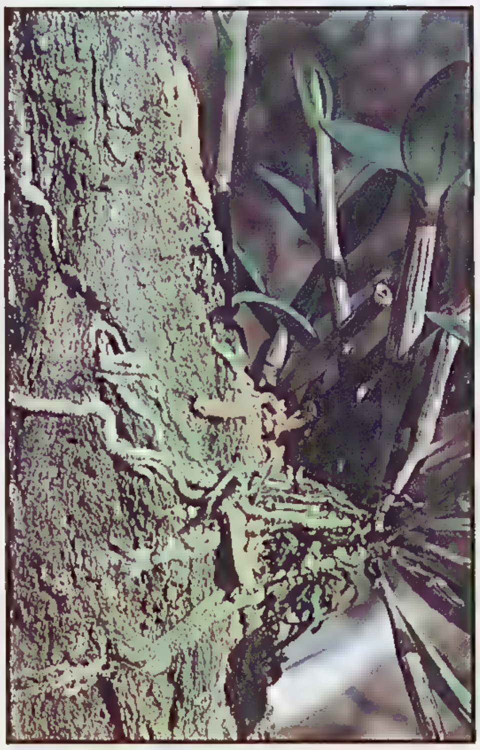

Plate 33: *Dendrobium aemulum.* Photo: R. Napier.

THE WALLACE LINE — IS IT RELEVANT TO "AUSTRALASIA"?

Gordon Morrison, B.Sc. F.L.S.(London), F.A.I.H.(Aust.),
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Every now and then a discussion on the Wallace Line and its implications seems to occur. Now is one of those times and it appears appropriate to have another discussion and perhaps throw more light (or confusion) on this subject.

Firstly, who was Alfred Russel Wallace (1823–1913)? He was a contemporary of three others, all expert on the subject of tropical biology. Charles Darwin (1809–1885), Henry Bates (1825–1892) and Richard Spruce (1817–1893).

Bates and Wallace teemed up as young men, both being keen entomologists but having a broader interest in Zoology. They arrived at the mouth of the Amazon on May 28, 1848 with the object of exploration. Wallace left the Amazon region in 1852, suffering from fever and sailed for England. The ship caught fire and he lost his entire collection.

Far from being daunted he later went to the "Malay Archipelago" where he spent eight years, collected 127,000 specimens and formulated his theory of natural selection. Whether we acknowledge the Wallace Line or not we must acknowledge that he was the foremost naturalist of that mid-nineteenth century in that area.

On June 18, 1858, Darwin received from Wallace a paper on a theory and mechanism for evolution. Darwin was shocked and depressed, the paper may have been written by himself as it contained the same theory which Darwin had been "sitting on" for 20 years. Now Wallace had upstaged him because of his tardiness.

In all fairness to Darwin, he did not try to suppress the paper but showed it to two colleagues, Charles Lyell and Joseph Hooker. They were previously aware of Darwin's work and ideas and saw no reason why he should be deprived of his share of credit. The two papers were read at a meeting of the Linnean Society of London on 1st July, 1858. There was no discussion for two reasons: (1) although the interest was intense the subject was too novel for the old school, and (2) President Bell suppressed any move to bring the subject up for discussion at anytime and this was followed by the next President Bentham (Burkhardt, 1982).

Darwin and Wallace continued corresponding to within 10 years of Darwin's death and there did not appear to be any animosity between them. Wallace was very mild mannered and often referred to the theory as Darwinism. There is little evidence to show that "he and Darwin were locked in continual combat" as stated by Steenbeeke (1992).

But why the Wallace Line? Numerous other lines in the same area had been proposed. The Müller line in 1846, the Zollinger line in 1857, the Wallace line in 1860, there was also the Weber line and the Dickerson Merril line of 1925-26. Von Malm also introduced a new variation in 1934. Most of these early determinations were made on the basis of zoogeography and some botanists have attempted to apply these to separate Laurasian and Gondwana flora. According to van Steenis (1979) this was not very successful.

Wallaces's paper in 1860 was called "On the Zoological Geography of the Malay Archipelago" showing that he did not base his work on botany so why should others do so?

FLORISTIC REGIONS AND STUDY AREAS

The term "Australasian" may have different meanings depending on whether it is defined politically, biologically, historically, tectonically, geographically or even emotionally. I have previous stated (Morrison, 1991) that Australasia and Malesia are two man-made terms created for convenience to define an area of botanical study or interest and should not be confused with floristic regions which have naturally derived boundaries produced by plate tectonics. It follows from this that one may define "Australasian" using whatever limits one desires to impose. However, there seems to be little reason to produce a definition which cuts any small land mass into two parts by a line and saying that plants west of this line are not "Australasian" but those to the east of it are so. To my mind this borders on the ridiculous.

THE ORIGIN OF ORCHIDS

Steenbeeke's (1992) philosophy that the most advanced family must, *ipso facto,* be the youngest is a little hard to swallow and that it arose 30 million years ago is not substantiated in any way. The alternative opinion and to my mind a much more preferable one, is that the orchid is a very old plant type which is why it is advanced, having had time to diversify into a multitude of shapes, distribute itself worldwide and be intimately associated with pollen vectors.

The angiosperms are believed to have arisen in the early Cretaceous period 144 million years BP (before present). The earliest fossil pollen found is monosulcate (having a single polar furrow) which is typical of monocotyledons so this, along with other macro fossil evidence, supports the premise that monocotyledons arose before dicotyledons or perhaps even concurrently with the dicots., as the primitive orders of Magnoliales and Nymphaeales had exclusively monosulcate pollen (Doyle, 1973).

Gondwana commenced to break up 125 m.y.BP and continued to 38 m.y.BP. Laurasia also rotated during this period and rifts occurred, so the 30 m.y.BP seems hardly tenable.

PLATE MOVEMENT

Fig. 4 shows the present position of land on the Sunda shelf and Sahul shelf with the lesser Sunda Arc in between. This latter is bounded by the Wallace line to the west and a complementary line (possibly the Weber line) to the east. Although nothing of plate tectonics was known in Wallace's time he fortuitously drew his line along the boundary of the Sunda shelf and this is why the Wallace line should be accepted in preference to other lines. Opinions vary whether this marks a botancial boundary (van Steenis, 1979) but it does mark a natural boundary on the earth's surface.

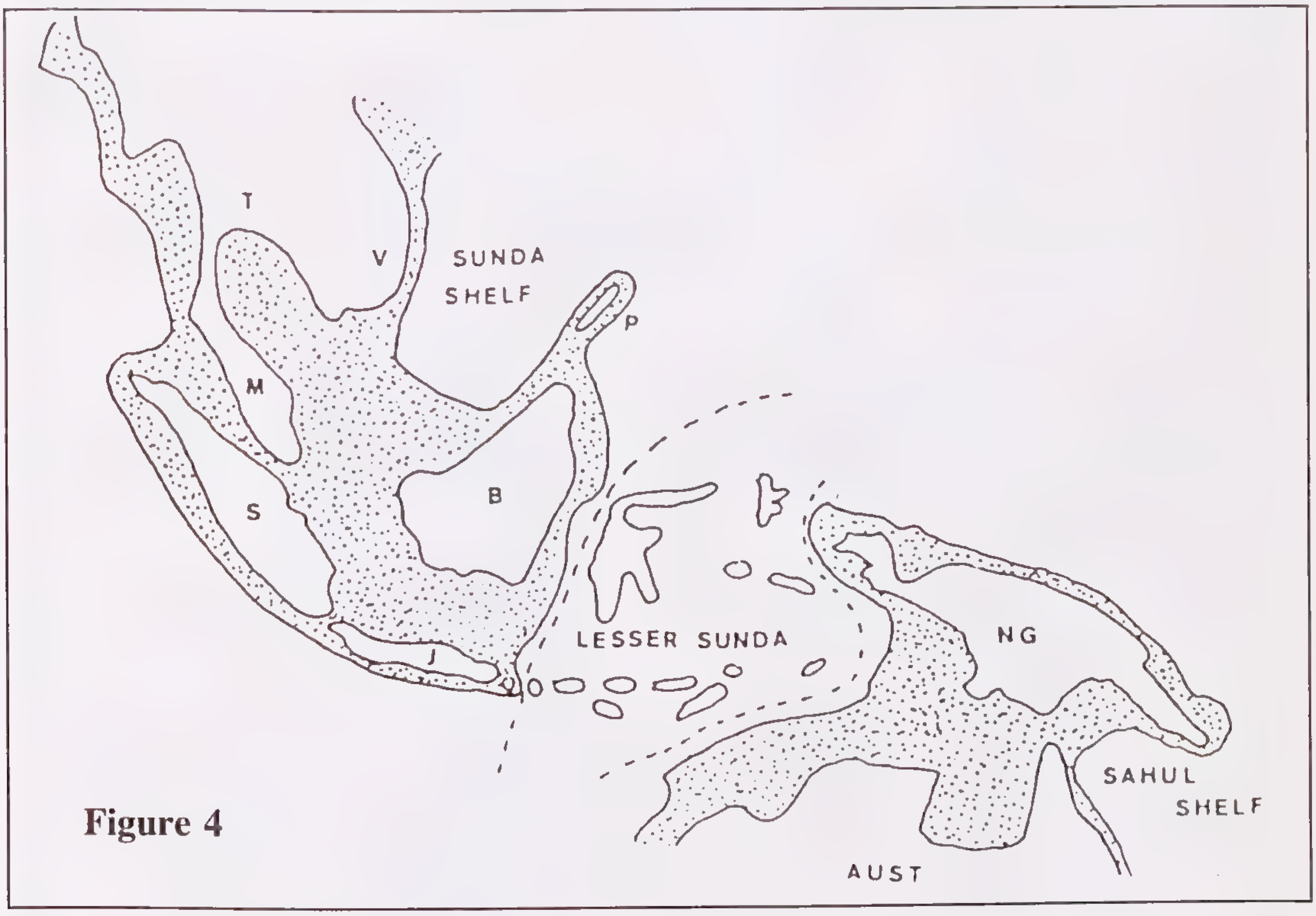

Figure 4

The present-day position of Sunderland showing countries located on the Sunda Shelf: Thailand (T), Vietnam (V), Malay peninsula (M), Sumatra (S), Borneo (B), Java (J) and Pelawan (P).
The Lesser Sunda Arc is bounded by the Wallace Line to the west and its complementary line to the east. New Guinea and Australia are shown joined by the Sahul Shelf.

A grain of monosulcate pollen is illustrated by Dressler (1981) as belonging to *Neuwiedia* a three anther plant regarded as the most primitive extant orchid. By the middle Cretaceous tricolpate pollen appeared but the early monocots., were monosulcate and the ancestors of later forms.

If the orchids arose 30 m.y.BP their distribution would be very restricted as

Sunderland was somewhat indefinitely attached to the Eurasian plate, hence it contained Laurasian flora. As the plate rotated clockwise, Sunderland was moved southwards and also pushed westwards by the Pacific plate.

The northern part of the Australian plate did not finish at Cape York but had another land mass on it further north. This became the southern part of New Guinea (Audley-Charles, Carter and Milson, 1972). In the early Tertiary (65 m.y.BP) the Bismark plate, which lay parallel to the Queensland coast, was submerged. As Australia had moved southwards the Bismark plate was pushed and rotated anticlockwise to a north-westerly position. At 58 m.y.BP the Australian plate commenced to move north. This finally jammed the Bismark plate between the Australian plate and the Pacific plate causing the Bismark plate to rise above the sea and possibly form the New Guinea mountain range.

Sunderland had by now (15 m.y.BP) moved sufficiently westward to avoid collision with the Australian plate. This left the northward bound Australian plate to collide with some islands in the Banda Sea (10 m.y.BP). These were pushed northward and became the Banda Arc. They have no connection with Sunderland or with the Australia–New Guinea land mass other than their contact with the Australian plate. Dickerson (1925) called this zone "Wallacea" an appropriate name that should be recognised today.

So it appears that New Guinea can be quite legitimately included within the Australasian concept and that Wallaceae has no tectonic claim to be so included unless it is desired to expand the area of botanical interest.

What about New Zealand? In Gondwana, Australia was joined to east Antarctica at Wilke's Land. The New Zealand mass was joined to west Antarctica at Marie Byrd Land. At 80 m.y.BP the New Zealand land mass broke from Antarctica severing all connection with Australia and finally formed New Zealand, Lord Howe Island, New Caledonia and Norfolk Island.

South Amercia continued to be tied to Antarctica via the Scotia Ridge until 30–40 m.y.BP about the same time that Australia broke free from Antarctica. Is it logical, therefore to include New Zealand and associate islands as part of Australasia and yet exclude South America which had a much longer, say 40 m.y.BP association with Australia?

From an east coast point of view many would say that emotionally anyway (and perhaps financially) New Zealand is a near neighbour and must be included. But what of our friends in Western Australia? To them New Zealand is distant. They may compare their flora with that of temperate South America and note similarities to that of south-west Australia and prefer temperate South America to be included in Australasia, rather than New Zealand. Remember the aim for A.N.O.S. to be "National". The east coast must acknowledge the west coast and its thoughts.

But many will say that Norfolk and Lord Howe Islands are politically part of Australia, even though, tectonically, they are part of the South-West Pacific Margin (which includes New Zealand). Well then, on the same basis what about the Cocos and Christmas Islands; they are also politically part of Australia. At 32 m.y.BP the Australian and Indian plates became united into a single plate, the Australian-Indian plate (Johnson, Powell and Veevers) and both of these latter islands are on this plate just south of the Java trench, so they must be considered, tectonically, as part of Australia and so have more justification for inclusion as "Australasian" then either Norfolk or Lord Howe Islands.

So the question of what constitutes "Australasian" has many facets. Some seem contradictory to others and it depends on how each is weighted.

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A.N.O.S. SYDNEY GROUP INC. DISCUSSES THE WALLACE LINE

Michael Harrison,
President,
A.N.O.S. Sydney Group Inc.

At its November, 1992 meeting, A.N.O.S. Sydney Group Inc. considered the question of the adoption of the Wallace Line as the constitutional boundary for Australasia.

The discussion commenced with the chairman displaying a map of the western and central Pacific/Australasia/South-East Asia region, upon which had been drawn two lines representing (a) the current constitutional boundary, and (b) the Wallace Line (Fig. 5).

It was explained that Alfred Russell Wallace was a 19th century biologist who worked extensively throughout Malaysia and the Indonesian archipelago between 1856–1863. He recognised the existence of a natural biological boundary between the flora and fauna of South-East Asia and Australasia, which although by no means absolute, was clearly identifiable. This line of demarcation runs roughly north/south, with Borneo and Bali on the western side of the line (i.e. not included in Australasia) and Sulawesi and Lombok to the east. Without any knowledge of continental drift and plate tectonics, Wallace could not explain how or why such a boundary should exist.

The meeting was then opened for general discussion. A number of members expressed their

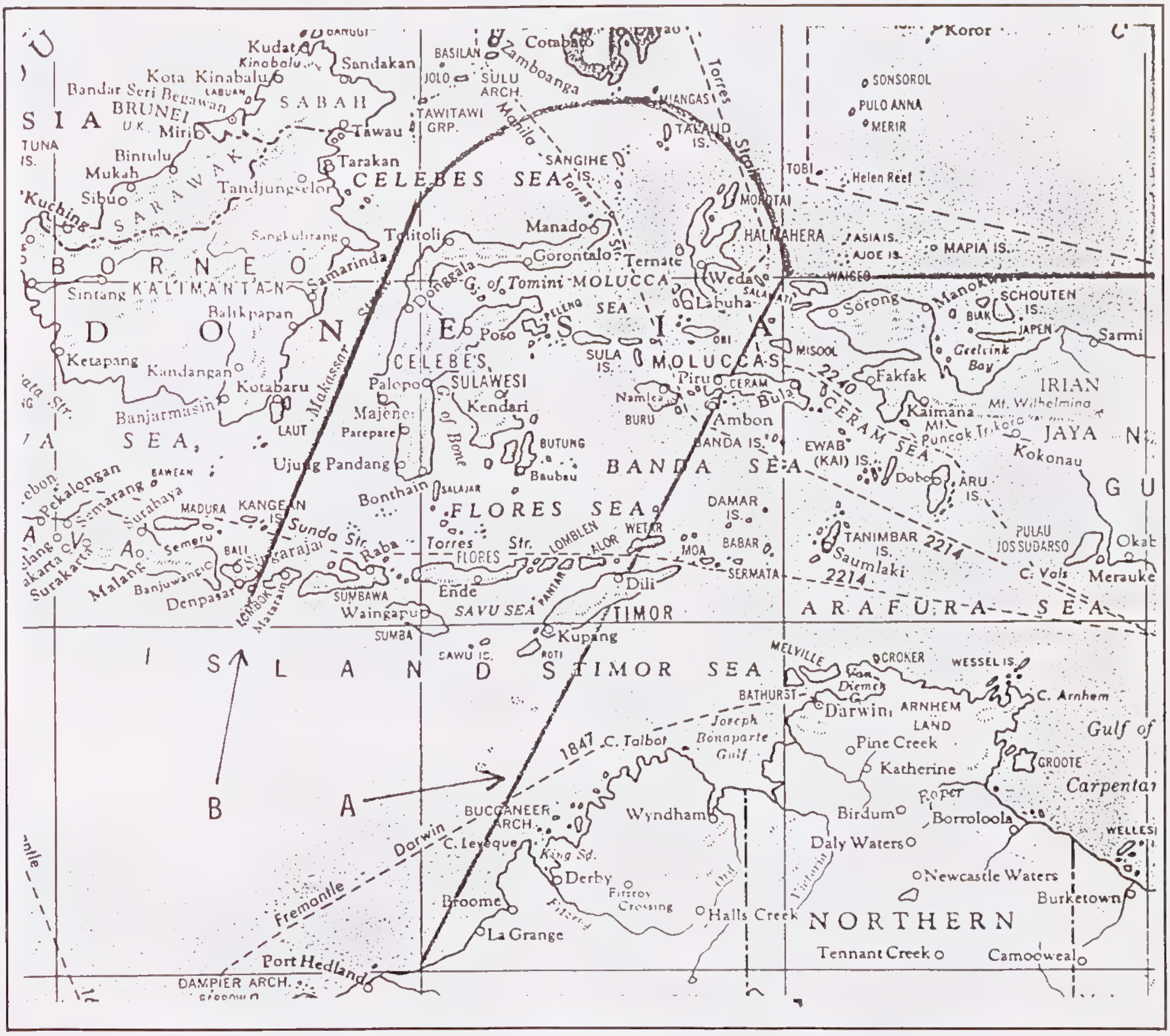

Figure 5: (A) Current A.N.O.S. Constitutional Boundary for Australasia;
(B) Proposed boundary following the Wallace Line.

views, the common theme being that there seems to be no really compelling reason to adopt such a change into the A.N.O.S. Constitution. Although it was generally agreed that the Wallace Line does represent a biogeographical boundary of sorts between Australasia and South-East Asia, there seems to be no real evidence to suggest that orchids (which is what we are interested in) have been observing this boundary. Certainly, at the generic level, there is no cutoff along the Wallace Line and there are many species which occur on both sides. Several members expressed the view that as far as orchids go, you could legitimately put the boundary just about anywhere. Wherever it is put, some orchid species would be included and some excluded, but the actual species involved is not really relevant.

Perhaps more importantly, however, it was felt that this debate is having a divisive effect upon A.N.O.S. and its members. The original A.N.O.S. Warringah Group motion called for the adoption of the Wallace Line as the western boundary for Australasia, as defined in the A.N.O.S. Constitution. The decision to be made was simply yes or no:– adopt the Wallace Line and by doing so expand the constitutional definition of Australasia, or leave the definition unchanged.

Unfortunately, the debate quickly escalated beyond this point. In some quarters of A.N.O.S. there now seems to be a view that the Society should amend its constitution by bringing the boundary all the way back to the Commonwealth of Australia and by changing the name of the Society to the Australian Native Orchid Society. The meeting agreed that such a serious split in opinion could be disastrous.

Finally, the chairman called for a vote on this issue. It was a practically unanimous decision of the members of A.N.O.S. Sydney Group Inc. that the Group would not support the adoption of the Wallace Line and that the A.N.O.S. Constitutional definition of Australasia should remain unchanged.

NOTICE FROM A.N.O.S. COUNCIL

THE AUSTRALASIAN NATIVE ORCHID SOCIETY INC. SPECIAL & ANNUAL GENERAL MEETINGS & ELECTION OF COUNCIL & ADVISORY COMMITTEE MEETING

The above meetings of the Society will be held at the Gosford R.S.L. Club, 26 Pacific Highway, West Gosford on Saturday, 31st July, 1993. Hosted by the A.N.O.S. Central Coast Group. Morning tea will be served from 9.30 a.m. and lunch will be available at the club.

The Special General Meeting will commence at 10 a.m. to vote on the following recommendation from the A.N.O.S. Advisory Committee.

"That the Society's rules be amended by deletion of Clause 17 [2]e." (Clause 17 [2]e requires that an auditor be appointed to audit the Society's accounts for presentation to the A.G.M., however the N.S.W. Department of Consumer Affairs stipulates that a Society's Financial Statement be submitted to the A.G.M. following expiry of the financial year, certified by three committee members and lodged as part of the Society's Annual Statement with the Department. This change to our rules would bring them into line with the Department's requirements).

Following this vote, the A.G.M. will be declared open and the Election of Council for 1993-1994 will take place.

The A.N.O.S. Advisory Committee Meeting will be held in conjunction with the above, commencing after the closure of the A.G.M.

A.N.O.S. Groups and associated Native Orchid Society's are requested to advise the Secretary the names of their delegates to the Advisory Committee Meeting or to nominate proxies (if required) before 24th July, 1993.

NOMINATIONS FOR ELECTION TO COUNCIL

Nominations for the election of A.N.O.S. Council are called for. These should be signed by a member of the Society, countersigned by the nominee accepting nomination and lodged with the Secretary no later than 24th July, 1993.

Positions to be filled are President, Vice-President, Secretary, Treasurer, Editor plus seven Councillors.

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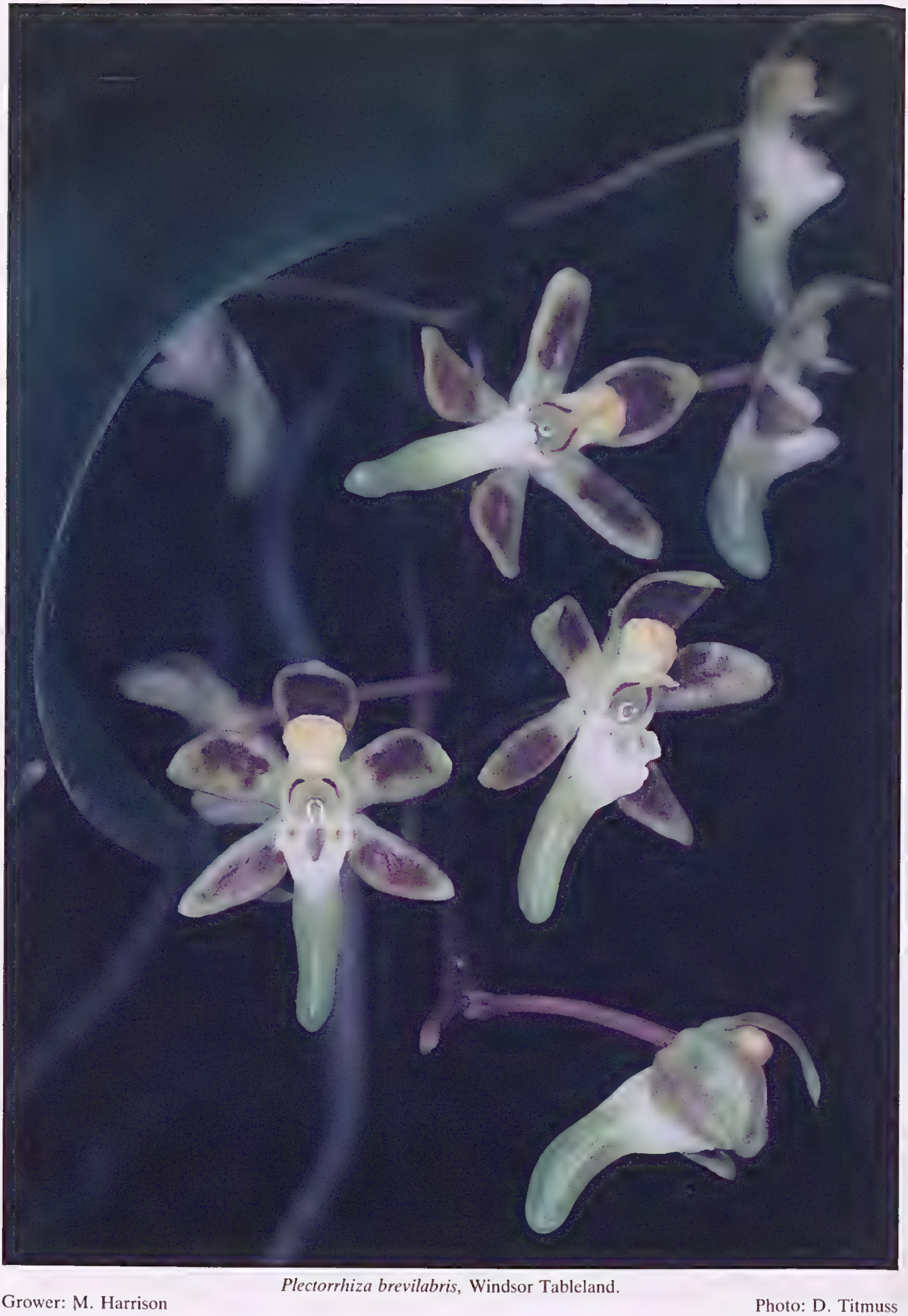

Plectorrhiza brevilabris, Windsor Tableland.

Grower: M. Harrison

Photo: D. Titmuss

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TALKING POINT

It seems there is a rumbling animosity between certain factions of the orchid growing community.

These divisions must cease. We need to be as one for the future of our native orchids. It appears to me that part of this division is the amateurs, the growers, the orchid lovers versus the botanists. Surely there is really no division, our aims, I hope, are the same. The botanist is not an ogre, trying to destroy our hobby, quite the contrary, he is embellishing it with research. For many years our native orchids were ignored but for a few dedicated botanists and amateurs and generally growers were frustrated because knowledge was not available.

Now this has changed, much research is being carried out. There is only a small band of amateurs helping our botanists, the rest talk against them. How stupid can we get, we are trying to build a foundation for the future of our precious natives, whilst others are digging beneath that foundation hoping it will collapse. We do not have to agree with all of the research being carried out, after all it was a long time before it was conceded the earth was round, but through debate the scientific facts were brought to the fore. So it is with orchids, our botanists are working day and night to achieve greater knowledge, they have the equipment as well as the qualifications, so let us help them all to produce a greater overall picture of our native orchids. A wider knowledge will assist us in the furtherance of our hobby together with the additional enjoyment through that enlightenment. They are dedicated scientists whether we agree with them or not is a matter for debate and if we do not get rid of this animosity our unique Australian native orchids will be the losers, not us. As individuals, we do not matter, we are only on this earth for a very short period of time and must do our best for the betterment of our environment, so that future generations can reap the benefit; not to destroy through our ignorance. Time will place today's research into its correct perspective, in the meantime, tolerance is needed, we must have this input of research to further the science. Afterall, what are we worried about, a few name changes, surely a minor detail compared to the wider picture. We all have our own ideas on our native orchids, let us discuss them in the atmosphere of the enjoyment of the knowledge that they are being researched, not with animosity or with the sense that this is an unnecessary change, because it is not, it is an essential part of our native orchids future. We must place all our energy towards building the foundation of a glorious future.

I have had talks with many of our botanists and they all believe in our native orchids, they want to go forward in harmony. I have asked David Jones if he will, in future "Orchadians", give us his views, his science, his projection for the future. Perhaps others will follow suit.

This is the last issue for Volume 10, so includes the index for the complete volume, I would like to thank Bob Napier for his assistance in the preparation of the index. It is not my intention to greatly change *The Orchadian* for the next Volume perhaps a few minor ones. The size will be slightly reduced to be more economical in paper usage, the pictures on the front covers will be by living artists; we have used FitzGerald's drawings on the front covers since the commencement of Volume 9 and they have served us well, but it is time for a change. If anyone has any bright ideas for the next volume please let me know. One thing must be strictly adhered to — we must continue to publish on time — to assist me in achieving this please let me have your much needed articles by the deadlines stated in the front of each issue. In the next volume I will quote the month of issue on the front cover, March, June, September and December, instead of the season of the year.

I would like to remind you once again that the Annual General Meeting will be held at the Gosford R.S.L. Club, 26 Pacific Highway, West Gosford, N.S.W. on Saturday, 31st July, 1993. Please come along and have your say on the running of your society and the election of officers.

Walter T. Upton

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Plate 1: Grow Top propagator trays and seedlings in glasshouse.

Plate 2: Seedlings with Grow Top removed. 29 days from flask.

Plate 3: *D. bigibbum* seedlings – 4 months 5 days from flask.

Plate 4: Vern Frampton and his seedlings.

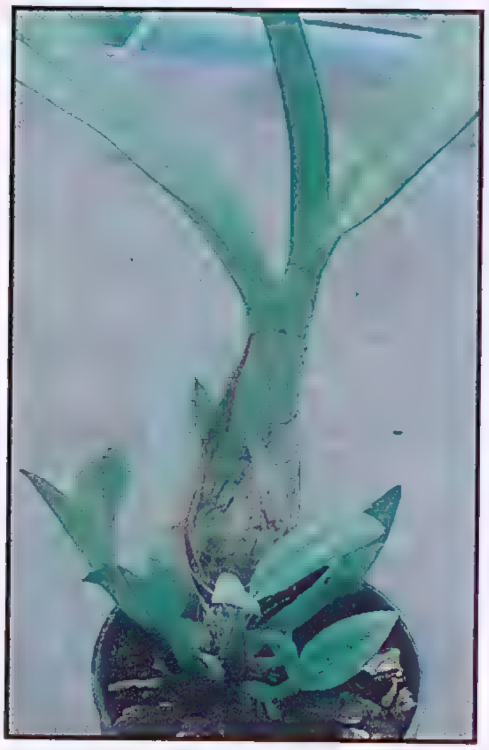

Plate 5: Seedling 4 months 5 days from flask. Photo: W. T. Upton.

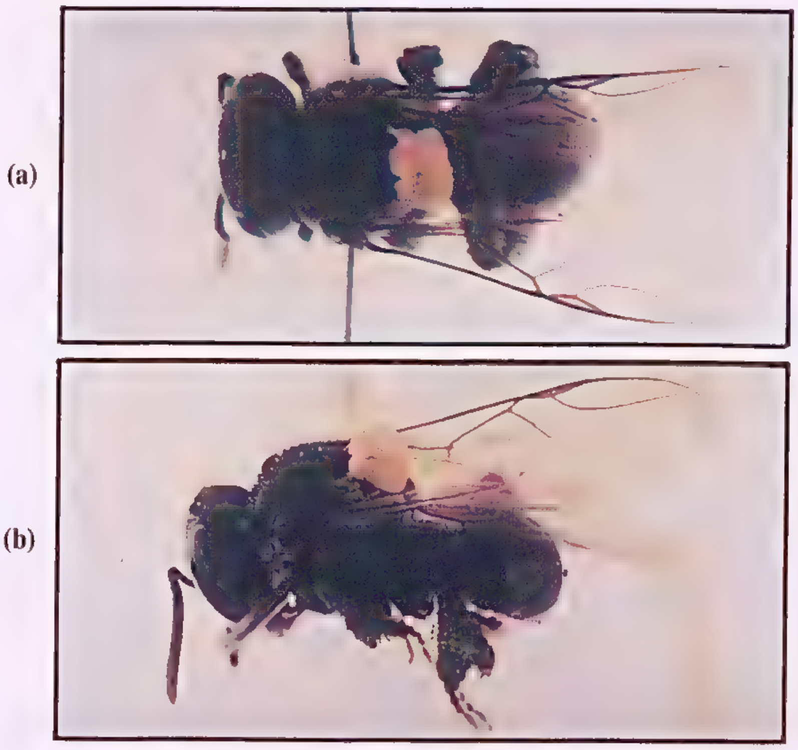

Plate 6: *Trigona* sp. with *Dendrobium monophyllum* pollinia attached to its scutum. (a) from above; (b) from side.

HOW I GROW *DENDROBIUM BIGIBBUM* SEEDLINGS

Vern Frampton,
364 Lakedge Avenue,
Berkeley Vale, N.S.W. 2259

I have for a long time, been attempting to grow *Dendrobium bigibbum* seedlings, however, until recently I have not had much success. As our cold winter months approached, my experience has been that the *D. bigibbum* seedlings stopped growing, with the result I had much trouble maintaining the seedlings through the winter. It was usually well into summer before they started to grow again.

It occurred to me there must be a better way of growing these seedlings, so my thoughts turned to horticultural warming cables; I have had some experience of these at Ryde Horticultural College, so I proceeded to make a heated bench top.

I am well aware that this technique is not new, although I have not heard of anyone using it to grow orchid seedlings to any extent.

The little experience I have had to date, has been very rewarding. My trays of seedlings are covered with a Grow Top propagator. These I can recommend and I feel that my success is partly due to them. I find that the best growing conditions are obtained when the thermostat is set at 21°C. In just a few short weeks I can achieve the same growth that had previously taken me twelve months.

As will be seen from Plate 1 my glasshouse is of galvanised pipe construction, covered with fibreglass sheeting and 50% shadecloth over the top. My benches are 75cm high, 1m wide and 4m long. The heated propagating bed is electrically heated, consisting of Pyrotenax horticultural cables. The smallest area that can be heated using a 240 volt supply is 2 square metres, otherwise elements need to operate on low voltage. To give an even growth throughout the bed, it is recommended that cable spacings do not exceed 100mm. My cables are fixed to an ordinary weldmesh bench and then covered top and underneath with solar weave plastic sheeting. This seems to work very effectively for me. I started operating my hot bed on 24th September, 1992, planting out my seedlings from flasks. Measuring my seedlings on 29th January, 1993, lots of the growths were 135mm in height, (see Plate 5) and most of the plants had multiple growths coming away from the base of the main growth, so for me, I feel that the expense of the warming cables has been well worth it.

After deflasking the seedlings I place all, except the very small ones, in 50mm round plastic pots, in "Debco" bark, medium grade (5–10mm). For the first two weeks they are kept in my flasking shed in reduced light. After this they are placed into the propagating trays in the glasshouse (see Plate 2).

During the initial three to four weeks a sheet of solar weave is placed over the trays when the light is very bright. The small green ventilator at the top of the Grow Top propagator is never opened. All my seedlings are watered three times a week. I feed regularly, once a week, with Aquasol and Phostrogen, alternatively at about half the strength shown on the packet.

Plate 1: Shows the Grow Top propagator trays and seedlings in the glasshouse.

Plate 2: Shows *D. bigibbum* seedlings with the Grow Top propagator removed. Taken out of the flasks on 1st January, 1993 – 29 days previously.

Plate 3: Shows *D. bigibbum* seedlings taken out of the flasks on 24th September, 1992 – 4 months 5 days previously.

Plate 4: Shows Vern Frampton and his seedlings.

Plate 5: Shows an individual *D. bigibbum* seedling – 4 months 5 days from the flask. Height of main growth 135mm. ✽

ADDENDUM —

VALIDATION OF THE NAME *BULBOPHYLLUM CALDERICOLA* G. F. WALSH

Bulbophyllum caldericola G. F. Walsh, as published in Orchadian (Vol. 10, No. 11, Autumn 1993, page 396), is invalid because the institution holding the holotype was not specified (according to Article 37.5 of the International Code of Botanical Nomenclature, 1988). The holotype of *B. caldericola* G. F. Walsh is held at the National Herbarium of New South Wales (NSW), Registered as Specimen Number NSW264966. The specimen held at the National Botanic Gardens Canberra (CBG) is an isotype.

Gerry Walsh,
7 Leslie Court,
Werrington 2747 ✽

SOME OBSERVATIONS ON THE POLLINATION OF *DENDROBIUM MONOPHYLLUM* F. MUELL. IN NORTH-EAST QUEENSLAND

*Tad Bartareau,
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*C/o Post Office, Herberton, Qld. 4872

Summary: The delightfully fragrant flowers of *Dendrobium monophyllum* F. Muell. attract worker caste native *Trigona* bees to pollinate the open flowers, yet little or no reward is offered to pollinators. The evidence indicates that *Trigona* Jurine sp. is the specific pollinator judging from the precise flower size, as well the location of attachment of the pollinia on the insect. This species has a low capsule set and predation and self-infertility influence capsule production. I speculate that pollination by *Trigona* bees may have influenced the evolution of fragrance and a nectarless pollination system in this species.

INTRODUCTION

Dendrobium monophyllum F. Muell., one of three indigenous orchids in the section *Monophyllaea,* grows on boulders and trees in humid open forest and rainforest margins between Cooktown and Grafton (Dockrill 1969, Jones 1988). In north-east Queensland this species is found above 600m, often abundant on large boulders bordering streams where plants form colonies that cover complete rock faces. In north-eastern New South Wales this orchid is widespread from the coast to about 1000m, often growing on *Casuarina glauca* trees and cliff faces (Jones 1988). Plants form small to large spreading groups of individual pseudobulbs, that are widely spaced, and found growing in conditions with plenty of light. Flowers are borne on short erect racemes throughout the year with peaks occurring in local areas so that several plants are in flower at the same time (Dockrill 1969, Jones 1988). Plants form one or two erect racemes with about 5–25 fragrant yellow flowers that are sometimes drooping. The flowers are not widely opening and about 8mm across. This species is reported to be poorly pollinated in nature (Jones 1988) and outbreeding (Adams 1988a). Questions remain on the identity of the pollinator of this species; how pollination is effected, and; do incompatible pollinations or infrequent visits limit capsule production?

Our knowledge of the pollination in native species of *Dendrobium* Sw. has increased in recent years (Adams *et al.* 1992), especially in the section *Dendrocoryne* (Jones 1983, Slater & Calder 1988, Adams 1988, b, 1991). Since there has been little reported about the pollination of species in the section *Monophyllaea* (Jones 1983), this study was designed to investigate the pollination system of *Dendrobium monophyllum.*

METHODS

I studied a population of *D. monophyllum* in the Atherton Tableland growing on boulders in tall open forest Type 14a (Tracey 1982), near the Walsh River, about 10km north-west of Herberton (17° 23' S, 145° 23' E, 900m), in north-east Queensland. During September to November, 1990, 17 flowering plants were located growing on four boulders and marked with a coded label. Also, two flowering plants were collected from two of the boulders and cultivated in a shadehouse at Herberton. These plants were grown in plastic pots with a mixture of charcoal, Quinkan gravel and leaf mould (2:2:1) and watered regularly. During September, 1990, three types of pollinations (xenogamous, geitenogamous and autogamous), were conducted on two flowers on each plant, using fresh pollen, about five days after anthesis. Xenogamous pollinations are where pollen from one plant is used to pollinate the flowers on another plant, geitenogamous pollinations are where pollen is transferred to another flower on the same plant and autogamous pollinations are where pollen is transferred to the stigma of the same flower. Each pollinated flower was placed within nylon mesh insect exclusion bags until capsule dehiscence. If capsule production in this population is limited by a self-infertile breeding system, then supplemental self-pollinations should fail to initiate and abort.

As ineffective or infrequent pollinator visits may be a source of pollen limitation, I monitored plant visitors, the number of flowers per plant, the number of flowers with pollinaria removed, number of flowers pollinated and number of capsules from September, 1990 to March, 1991. Predation was also recorded and I assessed capsule production just before dehiscence. A few insects carrying pollinia of this orchid were collected for photography and their pollen loads were also examined. Insects were washed with a few drops of absolute ethanol on a microscope slide to remove any attached pollen. Pollen taxa were identified against a reference collection of pollen from plants flowering within the community at the same time of collection.

RESULTS —
PHENOLOGY

In the Atherton Tableland, the flowering season is from August to November, but it can also be sporadic and plants produce one or two racemes. The flowers open from near the centre of a raceme (rather than from the base upwards) every two to three days, and last for up to 20 days if bagged with insect exclusion mesh. The flowers are sweetly fragrant at anthesis and the scent is apparent around 8.00 a.m., reaching a peak about 2.00–3.00 p.m. and then fading away at dusk. No perceptible odour occurs at night. Within a population, several flowers on different plants were open at the same time.

FLORAL MORPHOLOGY

Each inflorescence supports cup-shaped flowers on an erect raceme. In the closely spaced

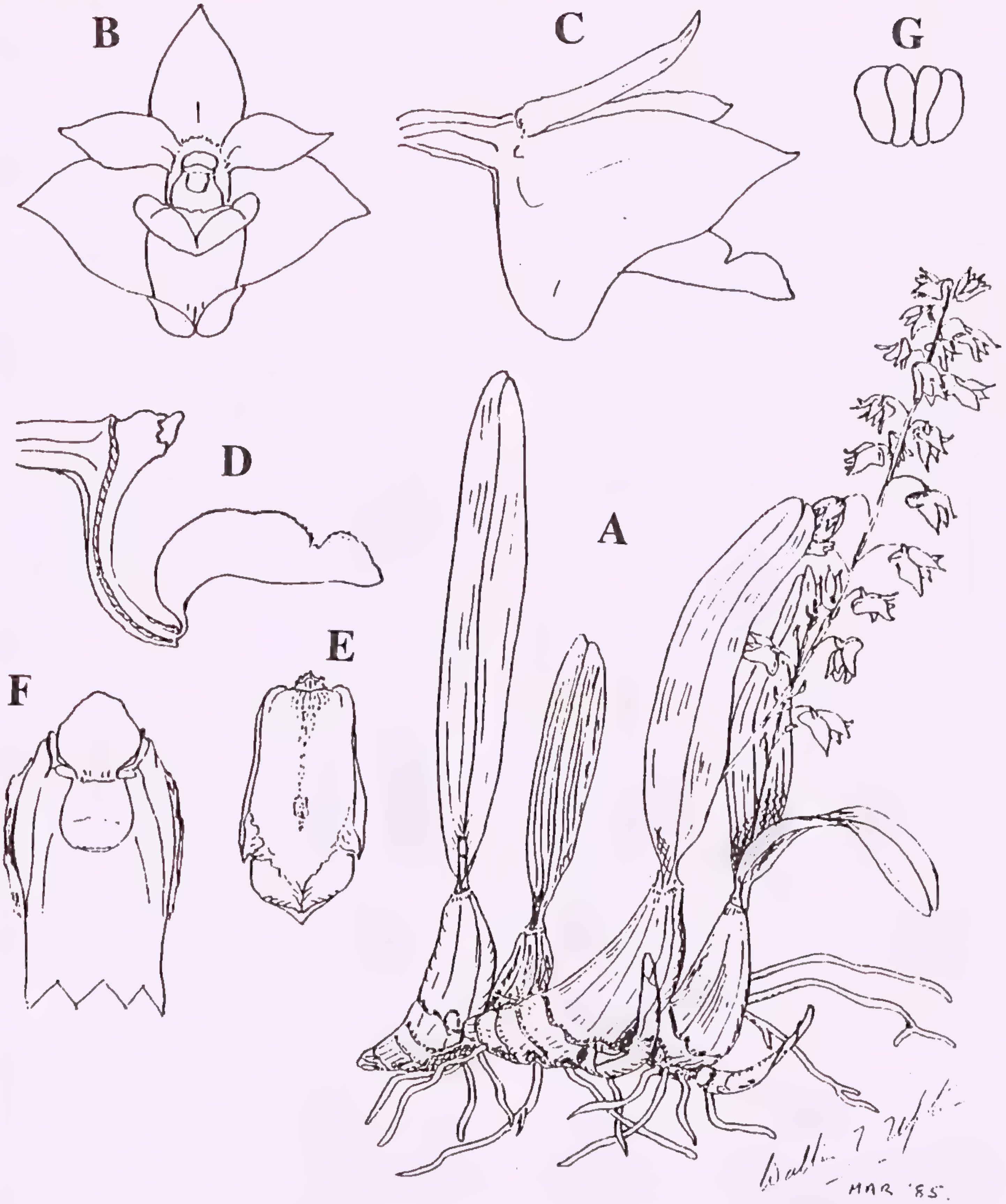

Fig. 1 – *Dendrobium monophyllum* F. Muell.

A	Plant	¾ x
B	Flower – front view	4½ x
C	Flower – side view	4½ x
D	Column and labellum – side view	4½ x
E	Labellum viewed from above	4½ x
F	Top of column – front view	9 x
G	Pollinia approximately	15 x

flowers, the dorsal sepal projects forwards and the triangular lateral sepals lie close to the obovate petals, the three-lobed labellum is curved and projects forward, and the lamina has two ridges of callus. The column is short (about 2–3mm) with a curved foot (about 5–6mm) and short apical teeth on either side. The stigma is almost reverse shield-shaped and the anther is small with a deflexed rostrum (Fig. 1A). Four pollinia are found in two closely appressed pairs, without caudicles or stipes and each pair are equal or nearly so in size and distinctly curve-shaped on the lower surface when viewed from the side (Fig. 1G). Floral nectar or free grain pollen reward is not offered to insects visiting the flowers. Extra floral nectaries are found on both flower and capsules and consist of an excretory gland at the base of the pedicel.

PLANT VISITORS

A range of flies and bees (*Apis mellifera* Linn., *Amegilla* sp., *Homalictus* sp., *Hylaeus* sp., *Lassioglossum* sp.) were observed visiting *Dendrobium monophyllum.* These insects would hover around open flowers for a short time before flying away. Worker caste *Trigona* Jurine spp. bees (female) were the only insects confirmed to pollinate the flowers of this orchid. The nectaries were found to attract ants (*Iridomyrmex* sp. and *Froggattella* spp.). The ants also tended scale insects which inhabited the pedicel of flowers and capsules. Aphids, assassin bugs, butterflies, dendrobium beetles (*Stethopachys formosa* Baly), grasshoppers and spiders were collected while visiting *D. monophyllum* plants. The spiders and assassin bugs were found to capture *Trigona* bees with and without pollinia attached to their bodies. The scale insects, aphids, grasshoppers and beetles were collected while feeding on the perianth and maturing capsules in about 71% of the plants, while spiders and assassin bugs were observed on 88% of plants. These results indicate that at least some plants may have developed more capsules than was recorded and low capsule production is likely to be partly the result of predation to capsules, flowers and pollinators.

POLLINATION

Pollinator activity was found to be confined to 11.00 a.m.–5.00 p.m. During these times the combined conditions of high temperature and relatively low wind velocity also favoured the increased fragrance intensity of *D. monophyllum. Trigona* bees approach a flower by a typical hovering behaviour and most of the approaches to *D. monophyllum* result with the insect landing on a flower. The fragrance produced by open flowers was apparent throughout all pollinator observations. *Trigona* bees were often observed to visit the recently opened flowers then slowly moving upwards or downwards on an inflorescence. Several *Trigona* have been observed hovering around the open flowers of plants growing on boulders near the Walsh River and capsules were often produced by their activities. These eusocial insects are invariably observed in small groups of individual worker castes when visiting large numbers of open *D. monophyllum* flowers.

From September to October, 1990, *Trigona* bees were observed to land on the flower pedicels and crawl towards the tip of the labellum of the open flowers. Initially they chew and scratch near the basal area of the labellum, then slowly move into the open flower apparently attracted to something at the base of the column. The insects appear to become temporarily trapped in the small flowers once their head reaches close to the base of the column foot. This theory is due to the considerable amount of time (about 20–30 minutes) the insects spend inside of flowers. While inside the flowers the insect is placed in a cumbersome head-down position in some flowers and they try to move backwards and forwards to escape the flower. A scent is produced from the base of the labellum and this may be the reason insects are lured into the open flowers, because the bees are not encouraged to visit the flowers by offering rewards. The labellum holds the insect firmly against the column as the insect's scutum protrudes into the sticky stigmatic cavity while it struggles to exit the orchid flower. After numerous trials the bees then slide to the side of the labellum, arch their body and with a reverse-wiggle manoeuvre slide their scutum out of the stigma and escape the flower. The insects use their back legs to hook the edges of the short labellum side-lobes (Fig. 1D–E) and this grasp probably enables their exit. The anther pivots on its filament to allow the pollinia to be deposited on the curved edge of the *Trigona* scutum where viscid stigmatic fluid is smeared (Plate 6).

During field study several bees with orchid pollinia attached were observed to fly a short distance from the inflorescence and then slowly fly back and visit another flower on the same or nearby plant. These bees visited two or more flowers while slowly moving on each inflorescence. The insect slowly enters an orchid flower with the pollinia neatly attached to its scutum. As it entered the small flowers the scutum comes into close contact with the column and portions of the orchid pollinia were then placed into the sunken stigmatic cavity to complete the pollination process. The majority of flowers observed to be *Trigona* pollinated were geitonogamous pollinations and few cross pollination events were recorded. *Trigona* bees were also observed to pollinate *D. monophyllum* plants growing in Len Lawler's garden (Atherton). Similarly, this bee slowly visited three open flowers on a single plant. After a flower has been visited the insect often remains on the apex of the labellum and wipes itself for about 0.5–1 minute as if collecting some remuneration. Some *Trigona* were observed feeding at the extra-floral nectaries.

Observation in the field had shown that *D. monophyllum* shares pollinators with a large number of species in the community which flower concurrently. Microscopic inspection of five *Trigona* visiting *D. monophyllum*, indicated that two had orchid pollinia, massulae and stigmatic fluids deposited on the curved edge of their scutum. All insects carried small amounts of other pollen attached to their body hairs and corbicula. Based on the pollen loads of these insects, it appears that *Trigona* also visited the fragrant flowers of nectar and pollen offering species of *Myrtaceae, Compositae, Dillinieaceae* and some identified taxa. These results indicate that low capsule production may be partly a result of ineffective self-pollinations, especially since pollinators are not encouraged to visit the nectarless flowers of this orchid.

POLLINATION LIMITATION

The results from the hand-pollinations indicate that this population of *D. monophyllum* is self-infertile as the four autogamous and four geitonogamous pollinations did not set seed capsules. In contrast the four xenogamous pollinations produced four capsules. Pollinated flowers begin to senesce within about two to three days of hand- or bee-pollination. Self-pollinated capsules abort within 20 to 30 days of pollination, while the capsules produced by cross-pollinations develop over a period of about 120 days.

Capsules were formed at almost every flower position on an inflorescence (Table 1) and the deposition of a pollinaria on the stigma of a plant was always accompanied by the removal of the intact pollinia from the flower. A large percentage of the flowers (average 85.4%) appear to have been visited at least once, but it is essential for an insect to make at least two floral visits to two plants if a successful pollination is to be effected, one to pick up pollinaria and one to transfer it to the stigma of a flower on a different plant.

To assess the pollination system I counted the number of flowers from which the pollinia had been removed and the number of flowers that produced capsules. About eight *Trigona* visitations per successful pollination event occurred (Table 1). The frequency of capsule production was greatest in two plants growing at Boulder 4. The flowers of these plants were in close proximity (about 4m) to large numbers of flowers on seven plants at Boulder 3. Capsule set was low in plants growing on Boulders 1, 2 and 3. Plants on Boulder 1 were about 15 metres from the plants on Boulders 2 and 4 and this distance may have reduced the probability of pollinators moving between these plants. Capsule set in a population of this orchid was estimated to average about 11.9%. These results indicate that low capsule production is likely to be partly a result of the low number of xenogamous pollen transfers.

DISCUSSION

Since *Dendrobium* is a large and variable genus in Australia (Dockrill 1969, Jones 1983), we might expect that plants have adapted to a range of conditions in the environment to ensure pollination. *Dendrobium monophyllum* does not produce any obvious reward, yet attracts *Trigona* bees as pollinators by visual as well as olfactory stimuli in a similar manner to several endemic Australian orchids (Adams *et al.* 1992). The present known mechanisms of attraction in *Dendrobium* have been grouped into the food deception category (Jones and Gray 1976, Slater and Calder 1988, Jones 1983, 1988), however Adams (1988b 1991) indicated that chemical components of the fragrance may be collected by *Trigona* visiting *Dendrobium kingianum, D. speciosum* and their hybrids. Chemical compounds of fragrance may be recognised by worker caste *Trigona* bees when visiting *D. monophyllum* and this may explain the high levels of pollinator visitation (average 84.5%).

Capsule development in species of *Dendrobium* is dependent upon style and pollen-tube compatibility (Johansen 1990). My results agree with Adams (1988a) who found *Dendrobium monophyllum* to be self-infertile and out-breeding. Few capsules were formed in the pollination events observed in the field as these were largely self-pollinations. These results may provide an explanation for the observation by Jones (1983) that few seed capsules are produced in natural populations. Low natural capsule production estimates have been reported for other native species of *Dendrobium* which are self-infertile and pollinated by *Trigona* bees, e.g. *Dendrobium speciosum* 2.3% (Adams & Calder 1982) and *D. kingianum* 2.1% (Adams & Lawson 1988). The overall capsule set of *D. monophyllum* in this study was estimated to be 11.9% which is comparable with those observations.

The extra-floral nectaries in a native terrestrial orchid has been interpreted as an adaptation to encourage residency by ants, which may protect an inflorescence from herbivores (Bates 1985). In this example, no obvious ant-guard was afforded by their presence and these insects were observed to tend scale-insects on flowers and capsules. Although ant-orchid associations are common in the Neotropics, there is little evidence that individuals are likely to derive benefit from their associations with ants (Fisher and Zimmerman 1988). It should be noted, however, that *Trigona* visitors provided a useful food supply to assassin bug and spider residents. These insect predators may have inhibited some herbivore visitors.

Speciation in orchids have often been linked to aspects of reproduction and ecology and the reproductive systems in epiphytes are considered to be highly efficient (van der Pijl & Dodson 1966, Dressler 1981). The evidence indicate that *Trigona* is a specific pollinator of *D. monophyllum* judging from the precise flower size, as well the location of attachment of the pollinia on the insect. The production of fragrance to attract *Trigona* bees may have encouraged the evolution of this species by developing an intricate pollination mechanism. If the pollination system observed in *D. monophyllum* is similar to that of other endemic native orchids, then this may be a significant factor in understanding the diversification of this flora. Recent studies of pollination in native orchids suggest that *Trigona* bees have exploited a niche in Australian orchid pollination that is paralleled by the activity of *Euglossine* bees in pollinating Neotropical orchids (Adams *et al.* 1992). Within the native orchids there is considerable scope for additional study and I would appreciate receiving information about both visitation and pollination of orchids by *Trigona,* with specimens if possible.

ACKNOWLEDGEMENTS

I wish to thank Chris Hill and Ken Walker for identifying the ant and bee visitors, respectively; Len and Kate Lawler for the time observing orchids in their garden; Betsy Jackes and Peter (Bill) Lavarack for their comments on an initial paper and Peter Adams and Walter Upton for their assistance with the final manuscript. This study was funded in part by research grants provided by the Department of Botany, The Australian Orchid Foundation and the support of family and friends.

Table 1: Flower number and pollination results recorded from 17 *Dendrobium monophyllum* plants growing on four boulders near the Walsh River, in 1990. [a]Number of capsules initiated (pollinia deposited on a stigma or obvious swelling of the ovary); [b]Number 1 is the first flower position at the base of an inflorescence; [c]%Number pollinia removed/%Number of capsules.

Boulder	1	2	3	4	Totals
No. of plants	3	5	7	2	17
No. of flowers	43	96	132	24	295
No. of flowers with pollinia removed (%)	31 (72.1)	87 (90.6)	116 (87.9)	18 (75.0)	252 (85.4)
No. of capsules initiated ([a]%)	22 (71.0)	78 (89.7)	102 (83.6)	10 (83.3)	212 (84.1)
No. of capsules (%)	2 (6.5)	11 (12.6)	8 (6.6)	9 (50.0)	30 (11.9)
Position of capsule on Raceme[b] (Mean)	7–8 (7.5)	2–18 (9.6)	5–18 (10.4)	2–10 (5.8)	2–18 (8.3)
Ratio[c]	11.1:1	7.2:1	13.3:1	1.5:1	7.8:1

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NOTES ON THE CULTURE OF AUSTRALIAN NATIVE DENDROBIUMS

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Abstract: Successful culture of Australian native dendrobiums requires knowledge of the habit of growth and ecology of the species. The man-made environment must be adapted to accommodate the requirements of the species for light, air movement, temperature, water and mineral nutrients and for the control of pests and diseases.

GROWTH HABIT AND NATURAL HABITATS

The key to successful culture of any orchid is an understanding of its habit of growth and its ecology (i.e. its relationships with its natural habitat). The Australian native dendrobiums have small to large pseudobulbs joined by a creeping rhizome. The pseudobulbs act as storage organs for water, mineral nutrients and products of metabolism such as sugars. The flexible, long, wide leaves and inflorescences are carried on top of the pseudobulbs. Those species in section *Rhizobium* (the pencil orchids) have no pseudobulbs and use their fleshy, more or less cylindrical leaves as organs of storage. The habit of growth determines if an orchid should be grown on a slab or in a pot. If the plant has a rambling habit, it often climbs out of the pot too quickly and is better suited to slab culture.

Its natural habitat determines the basics needed for good culture. Most of the species are epiphytes and grow naturally on the trunks and branches of trees, but some species, such as *Dendrobium kingianum,* are strict lithophytes and grow on rocks or cliff faces. Other species, such as *D. speciosum* and *D. jonesii,* can occur as both epiphytes and lithophytes. In all species, the roots are long and range far and wide, the epiphytes with their roots upon, under and between the outer bark layers of the tree and the lithophytes with their roots amongst the detritus of small stones, twigs, leaves and decomposing organic material on top of the soil amongst the rocks.

Some species, such as *D. tetragonum, D. teretifolium, D. pugioniforme* and *D. cucumerinum,* grow on the inner branches or trunks of the trees where it is shadier and more humid. Other species, such as *D. bigibbum, D. trilamellatum, D. monophyllum, D. gracilcaule* and *D. canaliculatum,* prefer the outer branches of forest trees, or the trunks of isolated trees where light values are higher and the humidity is lower. Still other species, such as *D. speciosum* and *D. jonesii,* can tolerate very high light and are often found in full sun on cliff faces.

Most of the species come from the coastal lowlands and adjacent mountains of Queensland and New South Wales, but one, *D. striolatum,* ranges into Tasmania. The more tropical species, such as *D. bigibbum, D. discolor* and *D. canaliculatum,* cannot tolerate frosts and grow at their best where minimum temperatures do not fall below 10°C. Many species, including *D. kingianum, D. speciosum, D. striolatum* and *D. teretifolium,* can withstand quite cold conditions and even light frosts.

POT OR SLAB CULTURE?

Some people have been able to grow all native dendrobiums in coarse fir bark and charcoal composts in plastic or terracotta pots. However, the rambling nature of the epiphytic species soon takes them over the edge of the pot. It is easier to mount the epiphytes on natural or compressed cork, hardwood palings, or slabs of tree fern. The plants can be tied to their mounts with fishing line, plastic-coated wire, pantyhose, or knitting nylon.

Make sure the plants are firmly tied to their mounts and that the new emerging shoot is closest to the mount and pointed towards the top of the mount. The roots like to roam freely and a large mount should be chosen to provide plenty of space for root growth.

The lithophytic species and hybrids from these species, grow better in pots. A coarse mix which provides excellent drainage must be used. Equal parts of coarse Perlite®, medium to fine bark and pea-sized gravel makes a good, long-lasting, free draining mixture.

AIR CIRCULATION

Air movement has three important roles to play in the successful culture of native dendrobiums. Firstly, it provides the carbon dioxide needed for transformation into sugars during photosynthesis. Secondly, it cools the leaves, thereby preventing overheating. Finally, air movement dries the leaves rapidly and so prevents many fungal spores from germinating and infecting the plants.

In their native environments, the epiphytic species growing on the outer branches of the trees and the lithophytic species on the cliff faces, get every passing breeze. Those species growing in the more sheltered environments of the inner branches and trunks of forest trees, or as lithophytes sheltering under overhanging branches, will receive fewer strong breezes, but the air will be humid and buoyant. If you can provide a similar buoyant atmosphere in the bushhouse, they will grow well for you.

TEMPERATURE

The tropical species: *D. bigibbum, D. nindii, D. discolor, D. affine, D. canaliculatum, D. antennatum, D. johannis* and *D. trilamellatum,* grow at their best in a heated glasshouse in locations south of Rockhampton. However, many of these warmth-loving species can be grown satisfactorily throughout coastal southern Queensland and northern New South Wales without heat, provided they are kept on the dry side and misted rather than watered, during winter. Further south, these species are definitely heated glasshouse subjects.

All of the species from the sub-tropical and temperate areas of Australia would not need heat during winter. In fact, many of these species, including *D. kingianum, D. speciosum, D. striolatum, D. pugioniforme, D. gracilicaule* and *D. teretifolium,* can withstand quite cold conditions. However, if your area experiences harsh winter temperatures, these species will grow better if you can provide sheltered conditions sufficient to maintain temperatures above about 5°C.

WATERING

When to water and how much to give, are problems with any orchid. Remember that species from north Queensland come from an area which has a wet, humid summer and a relatively dry winter and will grow better if these watering frequencies can be replicated in the man-made environment. However, the species from southern Queensland and New South Wales experience rain during both winter and summer.

In general, plants grown on mounts should be watered frequently, such as daily or two or three times a day, during periods of active growth, but for plants grown in pots, water less frequently, such as every two or three days. Most plants prefer cycles of wet and dry, so provide a period for drying out before rewatering.

During spring and summer, water more frequently than during winter when the aim should be to supply just enough water to prevent the plants dehydrating and the bulbs becoming shrivelled.

LIGHT AND SHELTER

Because many orchids grow naturally in trees or on rocks, we can grow many of them on the trees or in rockeries in our garden. If the orchid grows naturally near the main trunk, place the orchid in a similar position on the tree in the garden. Similarly, if the orchid grows naturally on the outer branches, place it in a more exposed position on the tree, or on a more sparsely leafed tree.

Plants that grow on rocks can be grown on rockeries in the garden. Again, some plants grow on rocks that are in deeper shade, or are fully exposed to the sun and wind. By placing some rockeries in full sun and others in deep shade, you can provide the environment preferred by the orchid you wish to grow.

Most people prefer to grow their orchids in shadehouses, bushhouses or glasshouses. By doing this, you have some control over the amount of air movement, temperature and light the orchid receives. You can also provide screens that prevent some insects entering the environment of the orchid. Hence, shadehouses, bushhouses and glasshouses allow the grower more control of the orchid environment and serious growers should give consideration to building such structures.

Careful attention should be given to siting these structures within the garden. Preferably place them so that the long axis of the benches can run north-south; this assures that all the plants receive an even amount of sunlight during winter. When benches are run east-west, the plants on the northern side of the bench will shade those on the southern side during winter.

Be aware of the positions of trees and the shade they provide during different parts of the day. You might be able to make use of this, or need to avoid it when deciding where to place your shelter.

In nature, most of the species prefer mottled, but bright light. Bush or shadehouses, covered with cloth giving 50% to 70% shade, are sufficient in most areas, but in regions where significant rain falls during winter, it may be advisable to provide a weatherproof area under fibrelgass or plastic sheeting for the north Queensland species.

FERTILISERS

Remember that most native dendrobiums are medium-sized plants and need only moderate amounts of fertilisers to grow. Some, however, such as *D. discolor* and *D. nindii,* can grow into very large plants and will need more fertiliser. Also, if you use cork mounts, the plants will receive no food from their mounts and will rely on you to provide all their needs. Remember that they should be fed during their season of active growth; therefore fertilise them during spring and summer. Better results will be obtained by applying fertilisers frequently, at low concentrations; a good motto seems to be "a little fertiliser, applied often, is better than a lot of fertiliser, applied infrequently".

PESTS AND DISEASES

Dendrobium beetles, mealy bugs, red spider mites, aphids, snails and slugs are the commonest pests. These should be controlled by using normal proprietary chemicals, taking all precautions against poisoning yourself while you are applying the chemical.

Fungal diseases which cause leaf spots can be controlled by monthly applications of preventative fungicides such as Maneb®, Mancozeb®, Dithane® or Bordeaux Mixture. Anthracnose fungus can be controlled by preventative sprays of Bordeaux Mixture or Bravo®.

Once the fungus has infected the leaf, these preventative sprays are useless and systemic fungicides such as Benlate® or Rovril ® must be used.

Bulb rots or damping-off are caused by the fungi *Pythium* and *Phytophthora,* or bacteria and can quickly kill a new growth and its bulb. These diseases should be controlled quickly by removing all diseased tissues before sealing the cut surfaces with sulphur paste, lime-sulphur, or Stoprot®. The plants should be given sprays of Aliette® or dipped in solutions of Fongarid®, Ridomil® or Previcur® to kill the fungi. The plants should be kept on the drier side to prevent reappearance of the problem. ✻

THE ORCHID MAN OF PATERSON

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HERMAN MONTAGUE RUCKER RUPP, B.A. — 1872–1956
RECTOR OF PATERSON, N.S.W. — 1924–30

In 1984 my husband Bill and I purchased a cattle grazing property at Martins Creek, a small village near the town of Paterson in the lower Hunter Valley, N.S.W.

Being lovers of nature and growers of orchids (Bill was foundation treasurer of the Newcastle Group of A.N.O.S.) we soon noticed native orchids growing on the hills and in the rainforest gullies of our farm.

Our duel interest in local history prompted us to become members of the Paterson Historical Society, a small dedicated group who, since 1974 had maintained a museum at the Paterson Court House. Seemingly to have a flair for display I was quickly appointed honorary curator of the museum.

My research in early 1992 for a display on the former rectory of St Paul's Anglican Church led me to read a book by Pauline Clements, "History of St Paul's Paterson" published by the author in 1984. In it was listed the incumbants from 1834 to 1980.

Vague replies to local calls prompted me to ring Dennis Rowe, Archivist at University of Newcastle in the hope that I may be able to research the diocese of Newcastle records in the university library. Dennis recalled Lionel Gilbert, retired lecturer of Armidale researching Revd. Rupp some time previously. What followed can only be described as great excitement, enlightenment and tremendous awareness of the dedication of Revd. Rupp to collecting and describing native orchids during the six years he was in Paterson.

Lionel Gilbert was most co-operative in forwarding background notes from the vast collection of material gathered over the years for his publication, to be titled, "The Orchid Man".

Reference notes by Revd. Rupp to the abundance of terrestrial orchids in the mulga scrub on the outskirts of Paterson was on the Keppie property. What a site to behold it was in the spring — a carpet of native orchids for months!

Knowing that Mabs and Bill Keppie maintained the grounds of St James Church, Martins Creek I had drawn their attention earlier to another reference by Revd. Rupp — a small colony of greenhoods in the church grounds.

Sure enough, a colony of *Pterostylis curta* appeared, approximately 150 plants with sixty-odd flowers. These have been photographed and recorded.

Great local interest has been renewed in the quiet, dignified and much-loved man.

"The Orchid Man" by Lionel Gilbert is a real gem — the references to the Paterson district so valuable.

With the assistance of local historian, Jack Sullivan of Newcastle, a display board on Revd. Rupp has been mounted and is on permanent display at the Paterson Court House Museum.

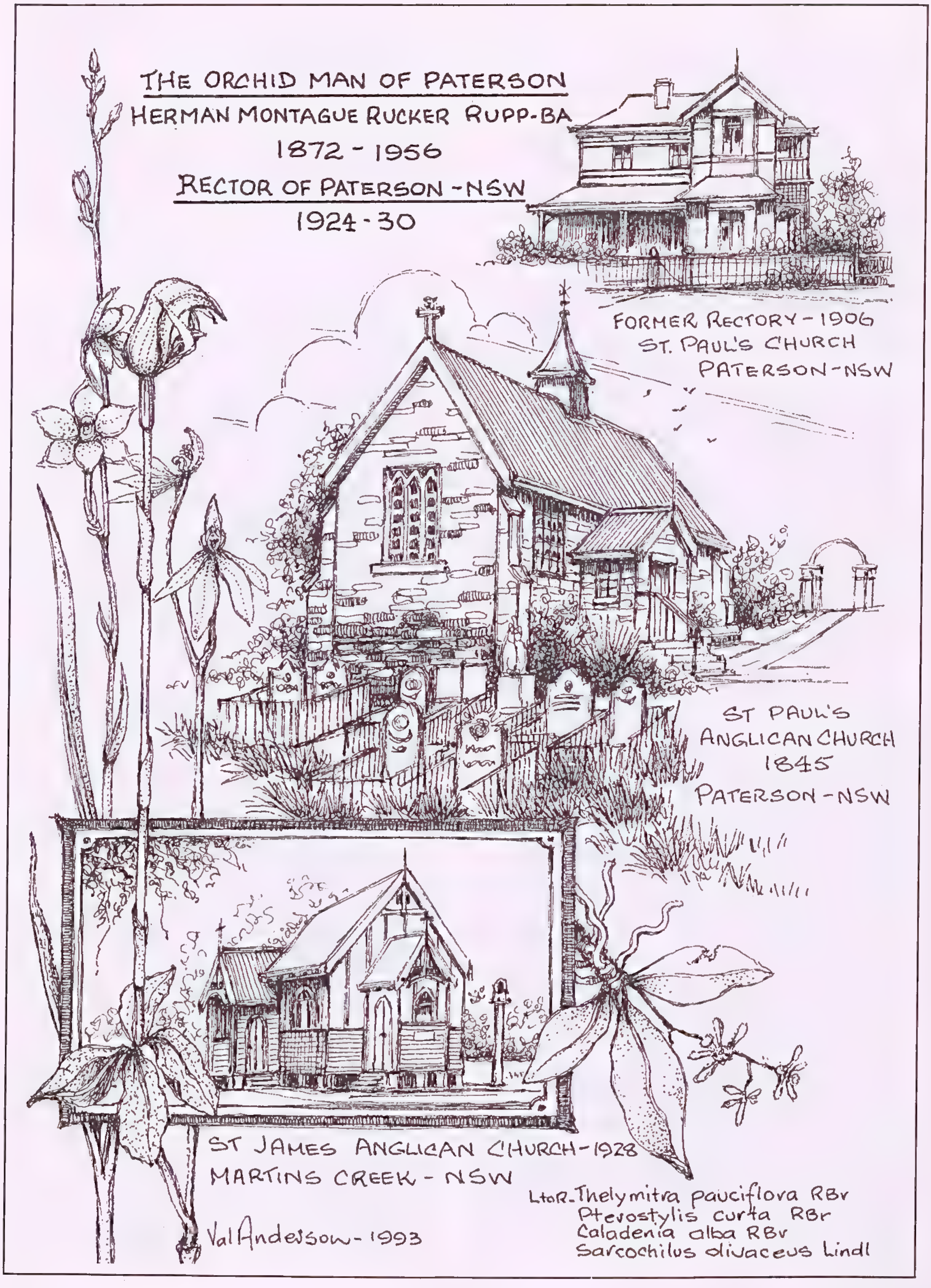
It will be a pleasure during 1993 when the Keppie's (who are great naturalists and decendants of James Keppie who arrived in Paterson in the 1830's); Lyn Walsh, a lecturer at Tocal Agricultural College and I plan to retrace the orchid recordings of Herman Montague Rucker Rupp — THE ORCHID MAN OF PATERSON.

From *The Australian Naturalist,* journal of the Naturalists' Society of New South Wales. Volume 7, Part 1, Pages 11 and 12, June, 1927.

TABULATED LIST OF ORCHIDS FOUND NEAR PATERSON, FROM OCTOBER, 1924 TO APRIL, 1927 BY THE REV. H. M. R. RUPP

Researched by Jack Sullivan – Newcastle.

Bulbophyllum elisae F.v.M.
  B. shepherdi F.v.M.
Dendrobium speciosum Sm.
  D. speciosum var. *nitidum* Bail.
  D. speciosum var. *hillii* F.v.M.
Dendrobium gracilicaule F.v.M.
  D. gracilicaule var. *howeanum* Maiden
  D. aemulum R.Br.
  D. linguiforme Swz.
  D. teretifolium R.Br.
  D. teretifolium var. *fairfaxii* F.v.M.
  D. beckleri F.v.M. (*D. schoeninum*)
Sarcochilus divitiflorus F.v.M. (*Rhinerrhiza divitiflora*)
  S. falcatus R.Br.
  S. olivaceus Lindl.
  S. hillii F.v.M.
Cleisostoma tridentatum Lindl. (*Plectorrhiza tridentata*)
  C. beckleri F.v.M. (*Papillilabium beckleri*)
Cymbidium canaliculatum R.Br.
  C. albuciflorum F.v.M. (*C. madidum*)
  C. suave R.Br.
Calanthe veratrifolia R.Br. (*C. triplicata*)
Galeola cassythoides Reichb. (*Erythrorchis cassythoides*)
Dipodium punctatum R.Br.
Calochilus campestris R.Br.
Thelymitra ixioides Lindl.
  T. canaliculata R.Br.
  T. pauciflora R.Br.
  T. carnea R.Br.
Diuris punctata Sm.
  D. aurea Sm.
  D. sulphurea R.Br.
  D. palachila Rogers
  D. pallens Fitzg.
  D. sp.
Prasophyllum nigricans R.Br.
  P. eriochilum Fitzg.
  P. sp.
Corysanthes fimbriata R.Br. (*Corybas fimbriatus*)
  C. pruinosa R. Cunn (*Corybas pruinosus*)
  C. aconitiflores Salisb. (*Corybas aconitiflorus*)
Microtis porrifolia R.Br.
M. parviflora R.Br.
M. oblonga Rogers
Pterostylis ophioglossa R.Br.
  P. concinna R.Br.
  P. acuminata R.Br.
  P. curta R.Br.
  P. nutans R.Br.
  P. pedunculata R.Br.
  P. obtusa R.Br.
  P. reflexa R.Br.
  P. revoluta R.Br.
  P. truncata Fitzg.
  P. mutica R.Br.
  P. rufa R.Br.
  P. longifolia R.Br.
Cyrtostylis reniformis R.Br.
Acianthus exsertus R.Br.
  A. fornicatus R.Br.
Eriochilus autumnalis R.Br.
Lyperanthus suaveolens R.Br.
Caladenia carnea R.Br.
  C. alba R.Br.
  C. caerulea R.Br.
Chiloglottis trapeziformis Fitzg.
Glossodia major R.Br.
  G. minor R.Br.


THE ORCHID MAN OF PATERSON
HERMAN MONTAGUE RUCKER RUPP-BA
1872 - 1956
RECTOR OF PATERSON - NSW
1924 - 30
FORMER RECTORY - 1906
ST. PAUL'S CHURCH
PATERSON - NSW
ST PAUL'S
ANGLICAN CHURCH
1845
PATERSON - NSW
ST JAMES ANGLICAN CHURCH - 1928
MARTINS CREEK - NSW
LtoR - Thelymitra pauciflora RBr
Pterostylis curta RBr
Caladenia alba RBr
Sarcochilus olivaceus Lindl
Val Anderson - 1993

Reprinted from *Phytologia* (October 1991) 71(4):322–325

A NEW SPECIES OF *SARCOCHILUS* R.Br. (ORCHIDACEAE) FROM AUSTRALIA

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Abstract: A new species of *Sarcochilus* R.Br. is described for the forthcoming Flora of New South Wales.

Key Words: *Sarcochilus,* New South Wales, Australia, Orchidaceae.

INTRODUCTION

The genus *Sarcochilus* in Australia comprises about 16 species distributed along the east coast. A taxon, suspected to be an undescribed species and known to orchid growers for some years, was studied in the field and compared with related taxa. That taxon is described here at species rank.

Sarcochilus aequalis D. Jones et M. Clements; species nova affinis *S. hartmanii* F. Muell. a qua floribus fulvis et racemis perbrevioribus differt.

TYPUS: Cultivated Australian National Botanic Gardens, ex Eudales Trail, north-west of Werrikimbe National Park, *L. Barton* s.n., (*D. L. Jones 2952*), 6 October 1988 (HOLOTYPUS: CBG; Isotypi: CBG, NSW).

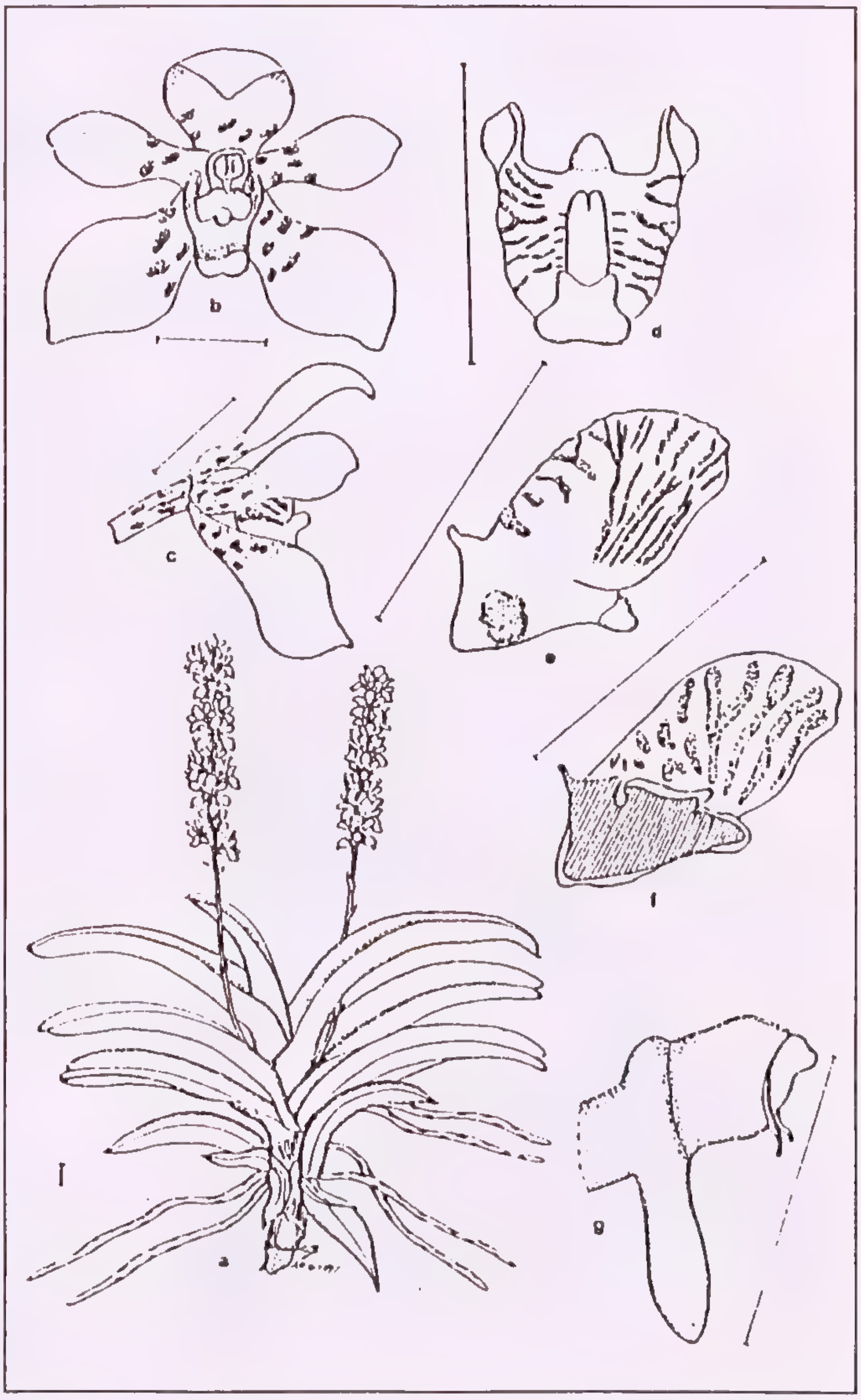

Figure 1: *Sarcochilus aequalis.* a, flowering plant; b, flower from front; c, flower from side; d, labellum from above; e, labellum from side; f, longitudinal section of labellum; g, column from side. Scale bar for all = 5mm.

Lithophyte forming small to extensive, crowded clumps. Stems 10–20cm long, erect to decumbent, sparsely branched, old parts covered with frayed leaf sheaths. Leaves 4–8 per stem, 8–12cm x 1.5–2.0cm, linear-oblong, spreading to slightly recurved, conduplicate, straight to slightly falcate, coriaceous, usually yellowish green. Racemes 1–4 per stem, 6–12cm long, erect or semi-erect, bearing 5–10, crowded flowers; peduncle about equal in length to rachis. Flowers 2.0–2.5cm across, cream with a few reddish spots towards the base of the perianth segments and red bars on the labellum; perianth segments cupped to spreading. Floral bracts ca. 2mm x 2mm, ovate, acuminate. Pedicels 8–12mm long, mottled and spotted with dark purple.

Ovary 3–5mm long, linear-ovoid. Dorsal sepal 9–12mm x 5–7mm, broadly elliptical, obtuse, imbricate, narrowed to base. Lateral sepals 9–12mm x 4.5–7.0mm, elliptical to broadly elliptical, divergent, obtuse to subacute, narrowed to base. Petals 7.5–12mm x 2.5–4mm, oblong-spathulate, obtuse. Labellum 7–8mm across when flattened, hinged at the base on a short claw; midlobe ca. 0.8mm x 1mm, yellowish; spur ca. 1.5–2.0mm long, subconical, fleshy, obliquely decurved; callus consisting of a fleshy ridge extending along the centre line of the midlobe, anvil shaped in longitudinal section; lateral lobes ca. 2.5–3.0mm x 2.5–3.0mm, orbicular, prominently striped with red. Column ca. 1.5mm long, projected forwards from the ovary. Column foot ca. 1.5–2.0mm long, at right angles to column, incurved near apex. Anther ca. 1.5mm x 1.5mm, with a very short, upcurved rostrum. Stigma ca. 0.6mm across, sunken. Pollinarium ca. 1.7mm x 1.2mm; pollinia ca. 0.7mm x 0.5mm, orbicular, orange, waxy; stipe ca. 0.6mm long; viscidium ca. 0.3mm long. Capsule not seen.

Specimens Examined: No herbarium specimens occur apart from the type collection.

Distribution and Habitat: Reported by orchid growers to occur in suitable sites on the Northern Tablelands of New South Wales between the Clarence River and the Manning River. This species occurs in gorges and along steep slopes, growing on rock outcrops, usually in semishade or filtered sun. Plants have also been found growing on rocks adjacent to waterfalls.

Flowering period: August and September.

Affinities: *Sarcochilus aequalis* is closely related to *S. hartmannii* F. Muell., the type of which was collected from Spring Bluff near Toowoomba in southern Queensland (Clements 1989). Both species have been cultivated for many years and *S. aequalis* has been known by orchid growers as the southern form of *S. hartmannii.* It is easily distinguished from that species by its cream flowers which are borne on relatively short, stiffly erect racemes in which the peduncle and rachis are of similar length. In *S. hartmannii* the white flowers are borne on long, arching racemes, the peduncle of which is much longer than the rachis. When grown together in collections, growers report that *S. aequalis* consistently flowers two or three weeks earlier than *S. hartmannii.* The two species are not sympatric and in fact are separated by a distance of about 400km.

Notes: *Sarcochilus aequalis* has been used in breeding programmes to produce hybrid progeny.

Conservation Status: *Sarcochilus aequalis* is present in National Parks but is still threatened by collectors; suggested status is 3RC according to the criteria of Briggs & Leigh (1988).

Etymology: From the latin "aequalis", of uniform or similar size; in reference to the similar size of the peduncle and rachis of the inflorescence.

ACKNOWLEDGEMENTS

We wish to thank Lex Barton for discussions about this species and assistance in the field, John Roberts for information and specimens from cultivated plants and Barbara Jones for processing the manuscript.

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Australian Native Orchid Show

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in conjunction with
The Australasian Native Orchid Society
to be held at
The University of Southern Queensland
Basketball Stadium
(off Baker Street, adjacent to the Japanese Garden)

17th–19th September, 1993

Admission Times:
Friday, 17th September, 1993
Saturday, 18th September, 1993
Sunday, 19th September, 1993

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Reprinted from *Phytologia* (July 1992) 73(1):3–6

A NEW SPECIES OF *DENDROBIUM* Sw., SECTION *DENDROCORYNE* (ORCHIDACEAE) FROM AUSTRALIA

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Abstract: A new species of *Dendrobium* Sw. is described for the forthcoming orchid volume of the *Flora of Australia.*

Key Words: *Dendrobium,* Queensland, Australia, Orchidaceae.

INTRODUCTION

The genus *Dendrobium* in Australia comprises about 60 species distributed mainly in north-eastern Queensland (Clements 1989). A new species which has affinities with *D. fleckeri* Rupp & C. White is described here as new.

Dendrobium Finniganense D. Jones, *species nova.* TYPUS: AUSTRALIA Queensland: Cook District: cultivated Australian National Botanic Gardens, *ex* Mt Finnigan, *L. Roberts s.n.,* (*L. Lawler 66*), 31 January 1992 (HOLOTYPUS: CBG; Isotypus: BRI).

Species nova affinis *D. fleckeri* Rupp & C. White a qua floribus majoribus graveolentibus; pedunculo longiore; sepalo dorsali latiore; petalis elliptico-lanceolatis latioribus; et labello majore lobis lateralibus brevioribus minus acuminatis, differt.

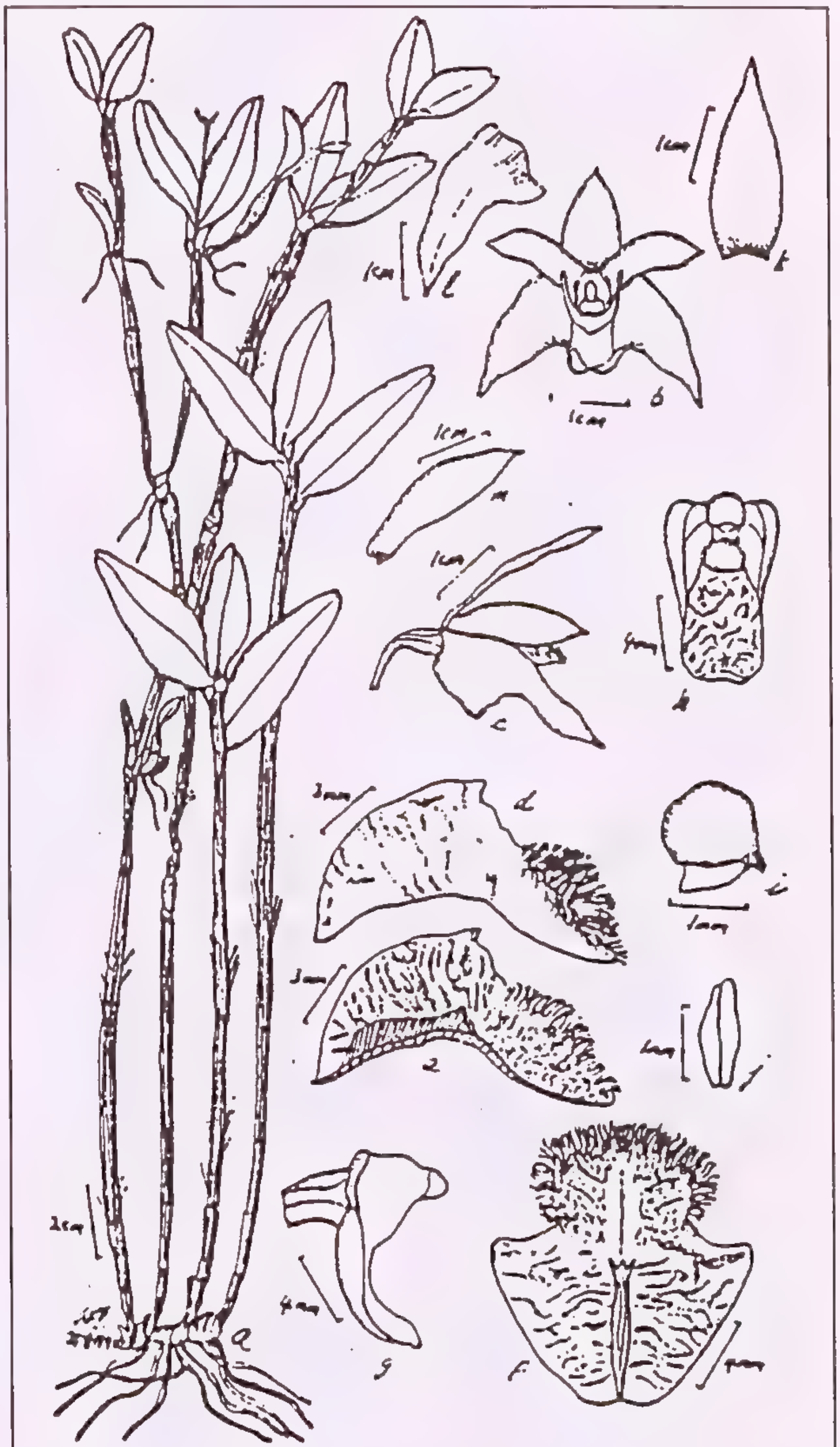

Figure 1: *Dendrobium finniganense,* Mt Finnigan, *L. Lawler 66;* a, plant; b, flower from front; c, flower from side; d, labellum from side; e, longitudinal section of labellum; f, labellum from above flattened out; g, column from side; h, column from front; i, anther cap from side; j, two pollinia; k, dorsal sepal, flattened out; l, lateral sepal flattened out; m, petal flattened out. All figures to indicated scale.

Terrestrial or lithophyte forming extensive branched clumps with numerous aerial growths. Pseudobulbs 2–24cm x 3–4mm, linear-terete, attenuate, shallowly sulcate, pale green to yellow, swollen at base then narrowed, slightly widening just near middle; nodes 3–7. Leaves 1–3, apical, 5–8cm x 1.6–2.0cm, elliptical to elliptical lanceolate, dark green, thinly coriaceous, porrect, apex unequally emarginate. Inflorescence solitary, terminal, each bearing 1 or 2 flowers. Peduncle 3.0–4.5cm long, erect. Floral bracts 3–5mm x 1.5mm, linear-ovate, acuminate, sheathing base of pedicel. Pedicel 10–14mm long, expanding gradually into the ovary. Ovary 3–4mm long, green. Flowers 26–34mm across, cream to white, yellowish and purple marked near the centre, expanding widely, strongly fragrant. Dorsal sepal obliquely erect, 22–26mm x 8–9mm, ovate-lanceolate, thick and fleshy, tapered to an acute to acuminate apex, mainly cream to white, yellowish at base with fine purple striae. Lateral sepals 24–26mm x 12–14mm, lanceolate, broadest near base, thick and fleshy, saccate and connate in proximal ventral quarter, falcate, apex subacute, cream to white, yellowish at base with fine purple striae. Petals porrect or spreading, 20–22mm x 4–5mm, linear to linear oblanceolate, falcate, acute to acuminate, cream to white, yellowish at base. Labellum obliquely erect at base then curved through 60°, 13–15mm x 12–13mm when flattened, trilobed; lateral lobes erect, ca. 8mm x 5mm, more or less triangular, cream irregularly and heavily barred with purple, margins entire; midlobe ca. 6mm x 10mm, more or less orbicular, broadly obtuse, margins and dorsal surface densely beset with transparent, glandular trichomes ca. 1mm long, a few purple markings also present; callus of a single, narrow, raised, central yellow ridge restricted to the proximal half of the labellum, apex trilobed, three vague ridges extending along the midlobe nearly to the apex. Column ca. 4mm long, projected forward from the end of the ovary. Column foot ca. 8mm x 4.5mm, curved, anterior surface heavily marked with purple. Anther ca. 2mm x 1.2mm, with a short, projecting, laciniate rostrum. Stigma ca. 2mm across, obovate-rectangular, sunken. Pollinarium ca. 1.5mm x 1mm, ellipsoid, orange-yellow, waxy. Capsule not seen.

Specimens Examined: Thornton's Peak, December 1990, ANZAAS Expedition (CBG).

Distribution and Habitat: Restricted to north-eastern Queensland where known with certainty from Mountains Finnigan, Pieter Botte (L. Roberts, pers. comm.) and Thornton's Peak; possibly also occurring on adjacent peaks. This species grows as a terrestrial or lithophyte at high elevations (about 1100m altitude) in open exposed sites among rocks and boulders.

Flowering period: November to January.

Affinities: *Dendrobium finniganense* has affinities with both *D. adae* Bailey and *D. fleckeri.* It can be distinguished from *D. adae* by its much larger flowers, broader dorsal sepal, broader, triangular lateral lobes on the labellum and the densely hairy midlobe to the labellum. From *D. fleckeri* it can be distinguished by its larger, strongly scented white flowers on a longer peduncle, broader dorsal sepal, broader elliptical-lanceolate petals and a larger labellum with shorter, acuminate lateral lobes. Plants of *D. finniganense* grow larger than the other two species (a single clump may be more than 90cm across and consist of more than 60 stems) and is also more prolific in the production of aerial growths, resulting in a mass of aerials growing on aerials.

All three species occur on Mountains Finnigan and Pieter Botte and Thornton's Peak, but are separated by altitude and or habitat and hybrids are unknown (L. Lawler and L. Roberts pers. comm.). The new species occupies the mountain summits growing in open situations and whereas *D. fleckeri* grows at the same altitude, it is found in shaded situations in rainforest. *D. adae* grows at lower altitudes than both of these species.

Notes: *Dendrobium finniganense* produces aerial growths copiously and colonises adjacent sites by this method of vegetative reproduction.

Conservation Status: *Dendrobium finniganense* is locally common, conserved in the Mt Finnigan National Park and is not threatened.

Etymology: In reference to the type locality of Mt Finnigan.

ACKNOWLEDGEMENTS

I wish to thank Lewis Roberts for collecting the original material and Len Lawler for bringing it to my attention and for numerous discussions about the species. I also thank Mark Clements for reading the manuscript, Corinna Broers for technical assistance and Alex George for supplying the Lating diagnosis.

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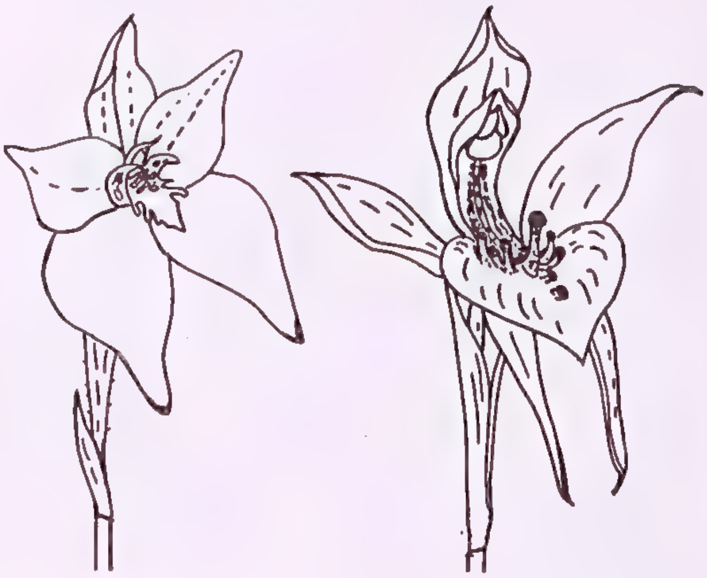
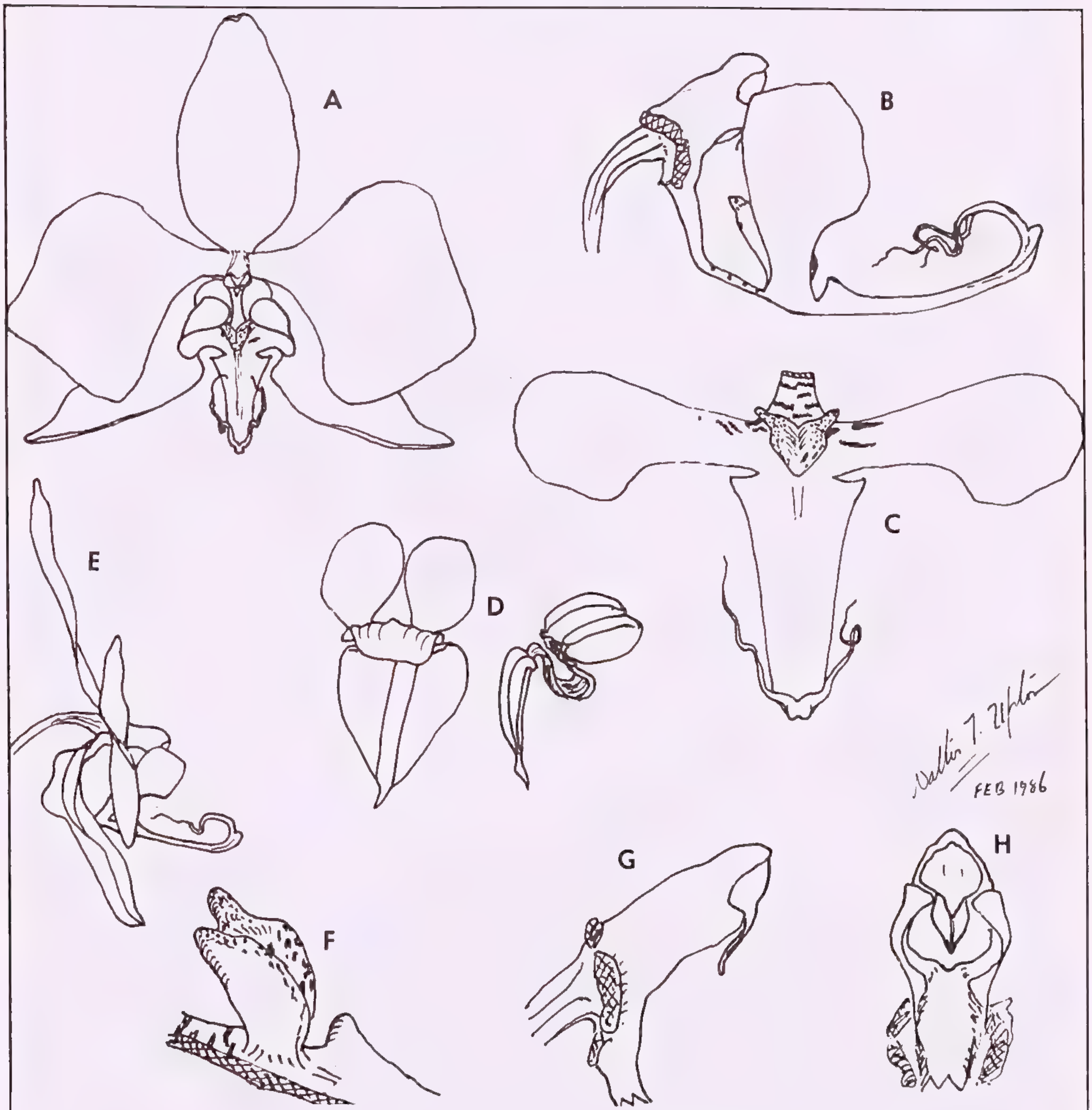




Phalaenopsis amabilis (L) Blume var. *papuana* Schltr

A	Flower front view	1 X
B	Column & labellum, side view	2 X
C	Labellum from above	2 X
D	Pollinarium	9 X
E	Flower side view	1 X
F	Callus	4 X
G	Column, side view	3 X
H	Column, front view	3 X

Phalaenopsis amabilis (L) Blume var. *papuana* Schltr
From a line drawing by Walter T. Upton

AUSTRALASIAN ORCHIDS ILLUSTRATED

No. 9: *Phalaenopsis amabilis* Blume var. *papuana* Schltr.

Common Name: Moth Orchid or Butterfly Orchid

Subfamily: Epidendroideae
Tribe: Vandeae
Subtribe: Sarcanthinae
Genus: *Phalaenopsis* Blume

Distribution: *Phalaenopsis* is a large genus extending from India, through South-East Asia to the Philippines, New Guinea and Australia. *Phalaenopsis amabilis* var. *papuana* occurs in New Guinea and tropical coastal north Queensland, from Mt Spec to Iron Range.

Notes: There is some controversy about the taxonomic status of the plant found in Australia. For many years, it, along with other vaieties of *P. amabilis,* was confused with the Philippine species *Phalaenopsis aphrodite* Reichb. f. Subsequently, the plant has been classified as *P. amabilis* Blume var. *rosenstromii* (Bailey), Nicholls, then *P. amabilis* Blume var. *papuana* Schltr., and most recently as *P. rosenstromii* Bailey (Clements 1989). The Australian variety is a large, epiphytic plant with a short thick stem and two to six thick, broad, usually drooping, leathery leaves up to 30cm long and 7cm wide. Flowers are borne on a long, arching, sometimes branched inflorescence, each branch carrying up to 10, large (5–8cm across), flat, white flowers with yellow markings on the mid-lobe of the lip. Flowering time is from December to April. It prefers a humid, warm, shaded environment with ample air movement. favoured locations are on trees near waterfalls, in deep gorges and on sheltered slopes and gullies. It is rarely found growing on rocks, or at altitudes above 500m.

Pollination: There is no recorded pollinator of this species.

Conservation status: *P. amabilis,* var. *papuana* is an uncommon species, spasmodically distributed over a narrow range in tropical Queensland. Collection and exploitation of its natural habitat have greatly depleted the wild population and it should be considered as threatened in its native habitats.

Culture: This variety can be readily cultured in tropical and sub-tropical Australia by slab culture in bushhouses. Further south, it is strictly a glasshouse plant. If pot culture is preferred, a coarse mixture of bark and charcoal, providing excellent drainage is essential. Moderate shade is adequate and daily watering in summer and autumn should be reduced to once or twice a week during winter. Regular feeding with fertilisers is beneficial.

Illustration: The painting illustrates a mature plant of *Phalaenopsis amabilis* var. *papuana* in its natural habitat.

Reference: Clements, M. A., 1989. Catalogue of Australian Orchidaceae. *Aust. Orch. Res.* 1:1–160.

Description: By Noel Grundon, Toowoomba, Queensland.
Painting: By Mair Swann, Atherton, Queensland.
Line Drawing: By Walter T. Upton, West Gosford, New South Wales.

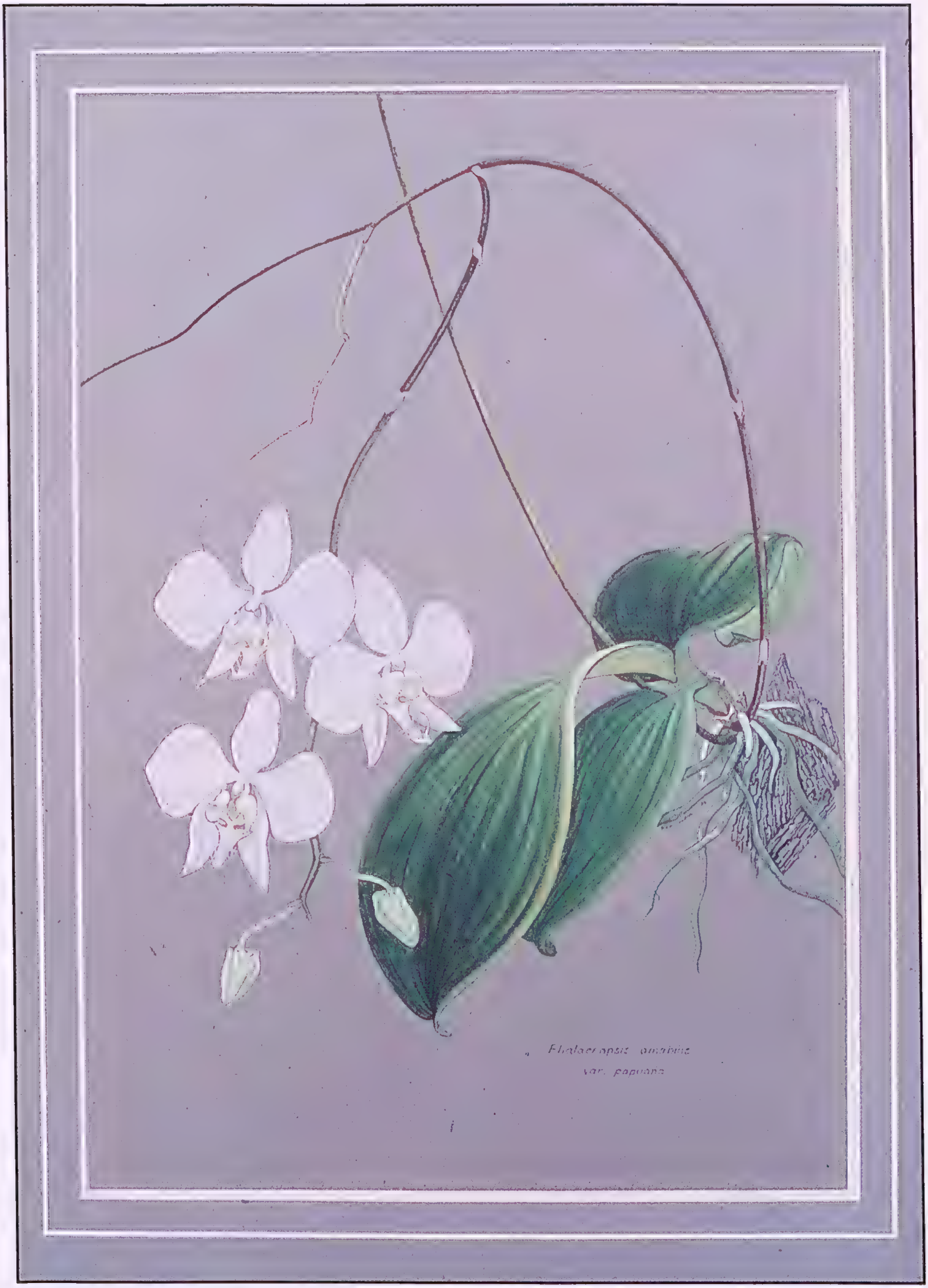


Plate 7: *Phalaenopsis amabilis* var *papuana*. From a painting by Mair Swann.

AUSTRALIAN NATIVE ORCHIDS ON BADGES

Barry Collins,
32 Panorama Parade,
Berkeley Vale, N.S.W. 2259

Nations unite under a flag. It is symbolic for a Nation, Community or Group to have a flag or coat of arms.

As far back as the Roman Empire, the various Legions bore their familiar eagles and vexilla (squares of cloth, hanging from a crossbar on a staff). Even earlier than this, evidence is abundant of standards being borne in Assyria from the 9th century B.C. Through the ages, attitudes and material things have changed, such as the restructuring of nations and the apparent greater need to identify oneself or one's country, army, group, etc. Consequently flags, banners, heraldic symbols, badges and similar have been designed. A badge is a distinctive emblem and we read, it was originally worn by knights, to identify themselves and their followers.

In 1215 the Jews were compelled to wear a distinguishing badge by a regulation laid down by the Fourth Lateran Council.

Clubs go back a long way too. The ancient Greek "hetaireia" and the Roman "sodalitas" are probably two of the earliest ancestors of the modern club.

In Rome religious and trade clubs were common.

To more modern times we find the MCC (Marylebone Cricket Club) was formed in 1787, the first Jockey Club about 1750, the Royal Thames Yacht Club 1775. The prototype of the service clubs was possibly the Royal Navy Club in 1674.

Now clubs are commonplace.

From the 1930's, the various orchid societies and clubs were being formed in Australia. Initially there was no mention of a badge, but during 1950, it became apparent that the orchid fraternity was about to follow the trend of other types of clubs and have a badge. To wear one's society badge was a sure way to promote the society. Most of the societies selected an exotic orchid species or hybrid as their emblem, very few chose our own Australian natives. However, from the middle seventies, things began to change. With the formation of the Australasian Native Orchid Society in 1964 and later the various native orchid groups, a greater awareness of our native orchids was experienced. Societies began to realise the beauty and uniqueness of our natives, with the engendered thought it would be sacrilege not to have a native as their emblem. Today a good percentage of the 195 orchid groups in Australia, have natives on their badges.

Research into the world's early orchid badges produced the information that Great Britain had a few early ones and that the American Orchid Society was the only early membership badge in America. It was not until the eighties that any other American society produced a badge. The New Zealanders had badges from the late sixties.

I first became interested in collecting orchid badges when I attended the 9th World Orchid Conference in Bangkok, Thailand in 1978. I took 10 Orchid Society of N.S.W. and five Eastern Suburbs Orchid Society badges and I managed to swap them. I received two English and the rest were Australian and New Zealand badges. I was better prepared for the next conference. It was the 1st New Zealand International Conference in Auckland in 1980. There I swapped many badges returning with 25 new badges to add to my collection. The following year 1981, I attended the 10th World Orchid Conference in Durban, South Africa and I took a great swag of badges. I received English, South African, German and a few New Zealand badges. At this same conference I became interested in orchids on stamps. For the next five years, I switched hobbies.

The badges were neatly put away out of sight. At this stage I had 148 badges in my collection. The orchid stamps had taken my fancy, but that is the subject of another article.

In 1986, I again became slightly interested in orchid badges. I received a letter from Jimmy Dench, a dedicated orchid badge collector. Jimmy had spoken to me on several occasions regarding the formation of an orchid badge club, much correspondence crossed the Tasman between us. Towards the end of 1987, I regained interest in the badges.

At the Australian Orchid Conference held in Sydney in 1988, a group of keen and enthusiastic orchid badge collectors held a special meeting. After a short discussion, it was moved to form the "Orchid Badge Club International". Jimmy Dench (New Zealand) was elected President, Ben Hardy (U.S.A.) Vice-President and I was elected Secretary-General. Since the formation of the badge club, we have enlisted more than 200 members. They come from England, U.S.A., Canada, South Africa, Zimbabwe, New Zealand, France, Germany and every State in the Commonwealth of Australia. Being world-wide the club does not hold meetings, except at a world or international orchid conference. Members display their badge collections in specially designed showcases. The organisers of these conferences realise the importance of our hobby and consequently set aside an area for our members to meet and to display our badges. The "Badge Corner" is a haven to badge swappers. It is part of one's luggage to take spare badges to a conference to swap with overseas registrants and at every conference new friendships are made. The badge club has an indexing system, every badge is numbered, indexed and placed in their respective groups (state, country or special). At the present time there are over 1,000 badges listed. Australia is well to the forefront with badges and as mentioned before a good percentage depict Australian native orchids.

SOME BADGES DEPICTING AUSTRALIAN NATIVE ORCHIDS

(Illustrated on pp. 464, 465 and Rear Cover)

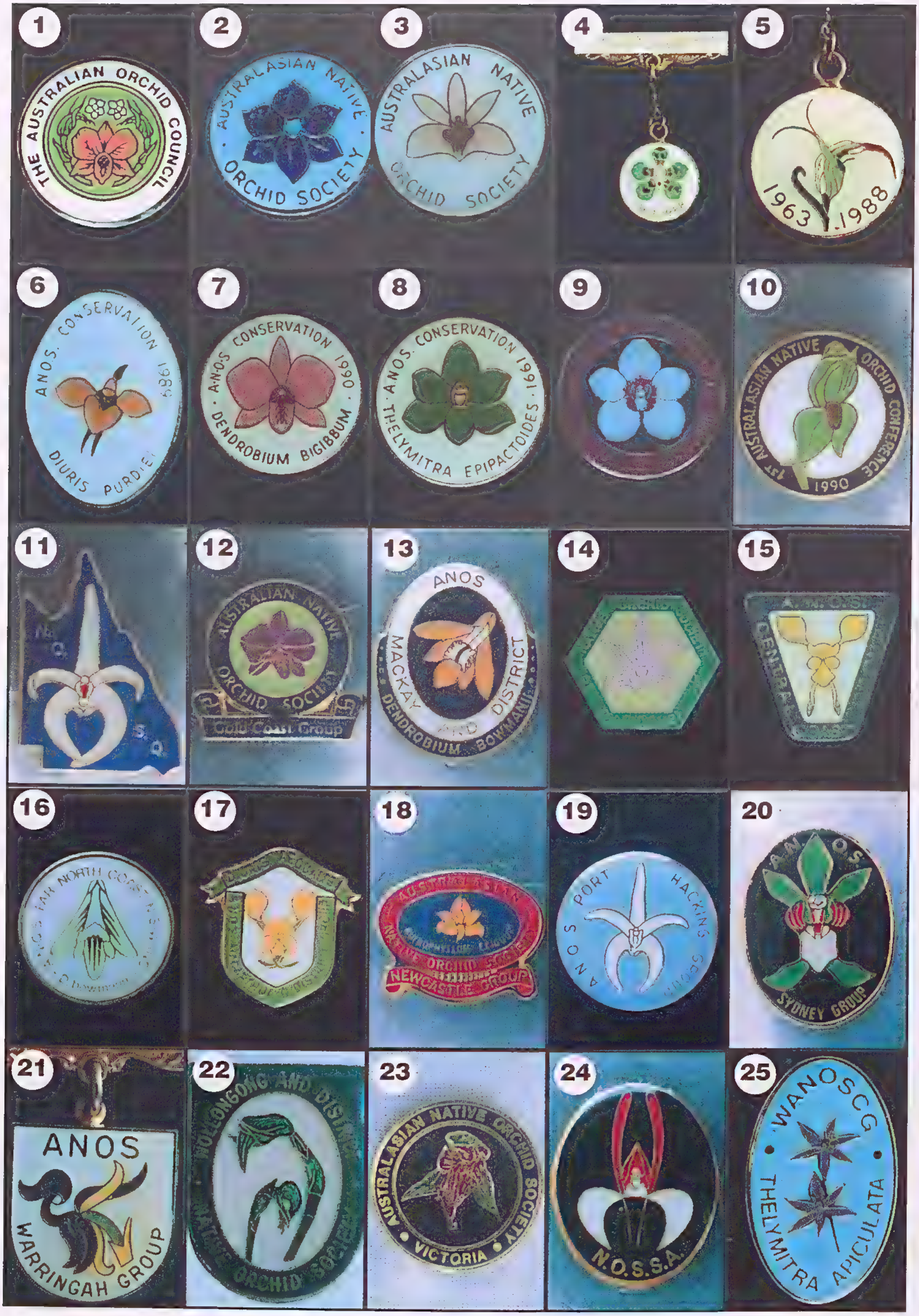
Name of Society	Native Orchid depicted
1. **Australian Orchid Council**	*Dendrobium bigibbum* *Sarcochilus* *Pterostylis*
Australasian Native Orchid Society	
2. Original	*Thelymitra ixioides*
3. Current	*Dendrobium kingianum*
4. Double sided badge on a swivel, 25 years	*Sarcochilus weinthalii*
5.	*Pterostylis laxa*
Conservation badges	
6. 1989	*Diuris purdiei*
7. 1990	*Dendrobium bigibbum*
8. 1991	*Thelymitra epipactoides*
9. 1992	*Sarcochilus hartmannii*
10. 1st ANOS Conference	*Pterostylis gibbosa*
ANOS Groups and Associated Societies	
11. Native OS of Qld	*Dendrobium speciosum*
12. Gold Coast Group	*Dendrobium bigibbum*
13. Mackay & Dist Group	*Dendrobium bowmanii*
14. NOS of Toowoomba	*Dendrobium*
15. Central Coast Group	*Diuris aurea*
16. Far North Coast Group	*Dendrobium bowmanii*
17. Macarthur & Dist Grp	*Diuris aequalis*
18. Newcastle Group	*Bulbophyllum exiguum*
19. Port Hacking Group	*Dendrobium speciosum*
20. Sydney Group	*Sarcochilus australis*
21. Warringah Group	*Caleana major*
22. Wollongong & Dist NOS	*Pterostylis*
23. Victorian Group	*Calochilus richae*
24. Native OS of SA	*Eriochilus cucullatus*
25. Western Australian NO Study & Conservation Group	*Thelymitra apiculata*
State Societies	
26. The O Council of Qld	*Dendrobium bigibbum*
27. The Queensland OS	*Dendrobium bigibbum*
28. Tropical Qld O Council	*Dendrobium canaliculatum*
29. 27th Conference 1992, Mackay	*Dendrobium discolor*
30. Ayr & Dist OS	*Dendrobium discolor*
31. Bramble Bay OS	*Sarcochilus hartmannii*
32. Brisbane OS	*Phaius bernaysii*
33. Bundaberg OS	*Caladenia*
34. Childers & Isis Dist OS	*Dendrobium speciosum*
35. Emerald O & Foliage Society	*Dendrobium bigibbum*
36. Glasshouse Country OS	*Calanthe triplicata*
37. Innisfail OS	*Dendrobium nindii*
38. Logan & Albert Orchid & Foliage Society	*Dendrobium kingianum*
39. Redcliffe Dist OS	*Caladenia catenata*
40. Sunshine Coast OS	*Thelymitra ixioides*
41. Townsville OS	*Phalaenopsis amabilis*
42. Tully & Dist OS	*Phaius tancarvillea*
43. The OS of NSW Ltd	*Sarcochilus falcatus*
44. Albury-Wodonga & Dist OC	*Chiloglottis X pescottiana*
45. Grafton Dist OS	*Sarcochilus fitzgeraldii*
46. Hawkesbury Dist OS	*Phalaenopsis amabilis*
47. Manly-Warringah OS	*Dendrobium bigibbum*
48. Nambucca Valley OS	*Cymbidium suave*
49. Port Macquarie OS	*Dendrobium kingianum*
50. Tweed Dist OS	*Sarcochilus hartmannii*
51. Canberra OS	*Caladenia carnea*
52. Bendigo Orchid Club	*Pterostylis nutans*
53. Gippsland Orchid Club	*Diuris*
54. West Gippsland O Club	*Thelymitra ixioides*
55. Yarra Valley OS	*Diuris punctata*
56. Tasmanian OS	*Pterostylis*
57. Scottsdale OS	
58. APOC Adelaide	*Diuris*
59. Northern & Eastern Districts OS	*Pterostylis nana*
60. 13th AOC Conference, Perth 1991 (OS of WA)	*Caladenia roei*
61. Species Soc of WA	*Diuris longifolia*
62. Wanneroo OS	*Elythranthera brunonis*
63. OS of Northern Territory	*Dendrobium affine*
64. Litchfield Orchid Club	*Dendrobium affine*
65. Nightcliff OS	*Dendrobium canaliculatum*
66. The Katherine O Grp	*Cymbidium canaliculatum*

SOME BADGES DEPICTING NEW ZEALAND NATIVE ORCHIDS

67. New Zealand National Orchid Group	*Corybas*
68. OS of New Zealand	*Pterostylis banksii*
69. Canterbury OS	*Pterostylis banksii*
70. Dannevirke & Dist OS	*Thelymitra*
71. Hutt Valley O Circle	*Pterostylis banksii*
72. Kaitaia OS	*Pterostylis banksii*
73. Thames Valley OS	*Corybas rivularis*

SOME BADGES DEPICTING PAPUA NEW GUINEA NATIVE ORCHIDS

74. The OS of PNG	*Dendrobium johnsoniae*
75. The OS of PNG	*Dendrobium lasianthera* ✱



Australian Native Orchids on Badges

Photos W.T. Upton

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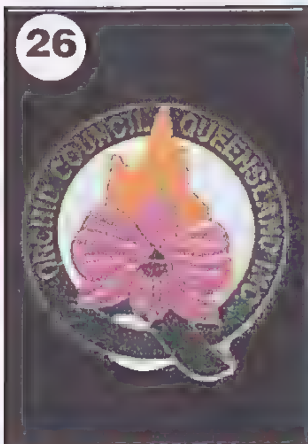

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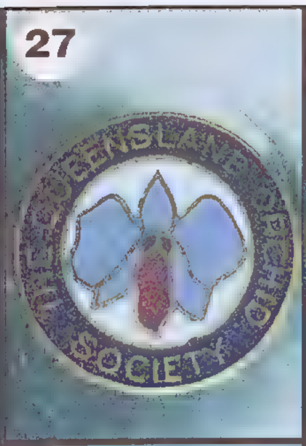

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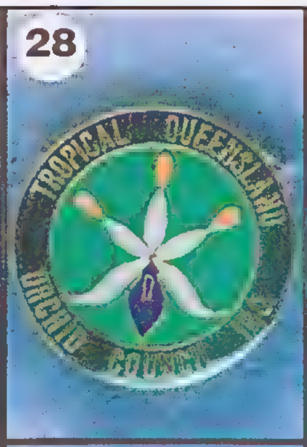

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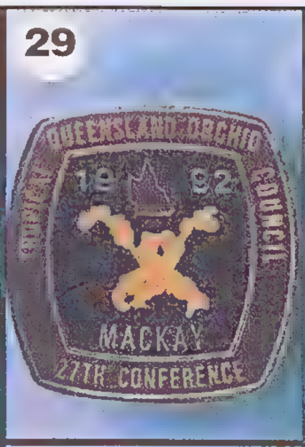

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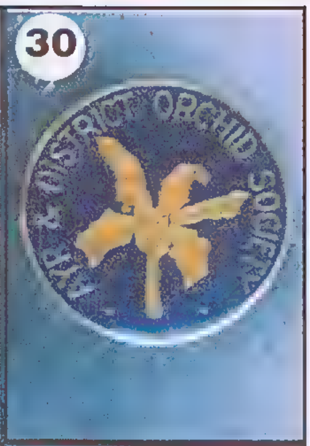

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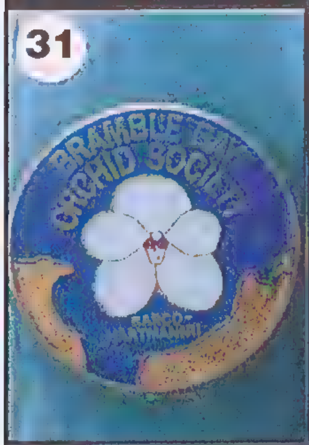

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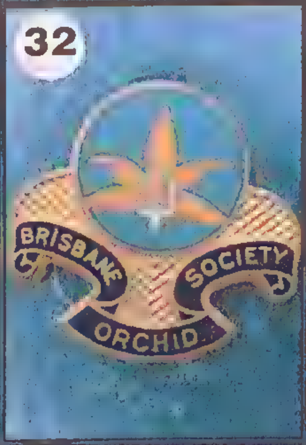

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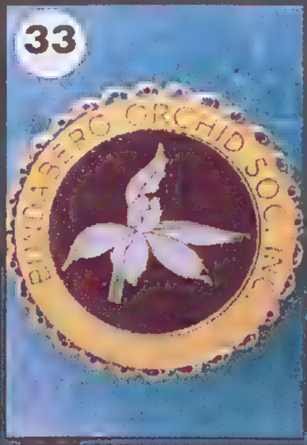

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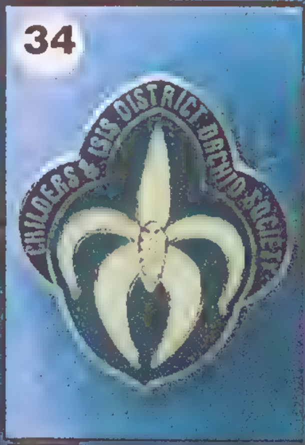

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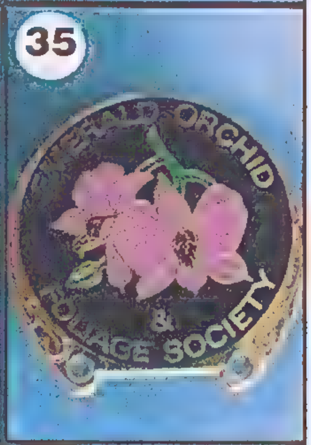

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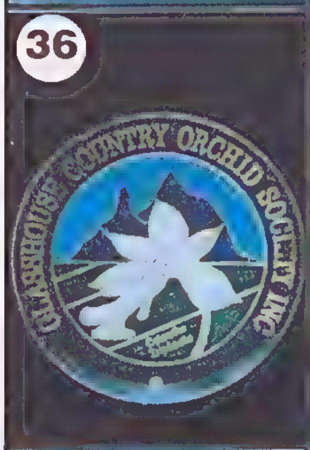

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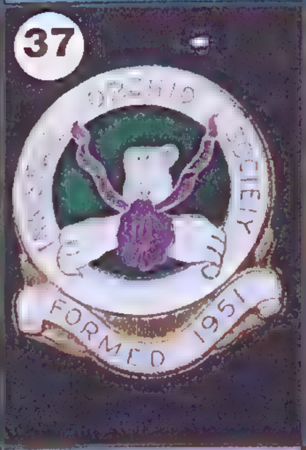

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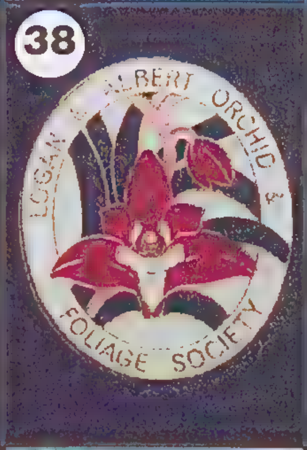

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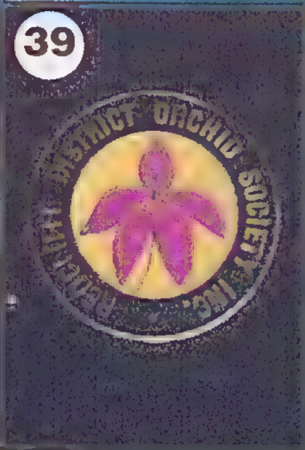

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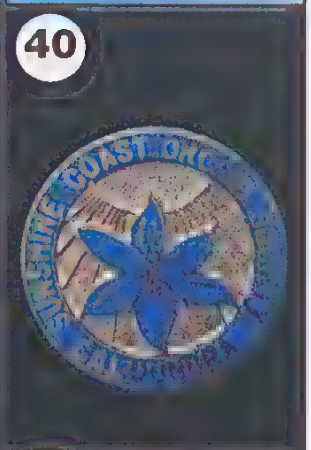

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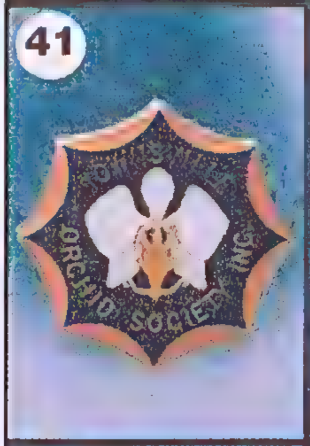

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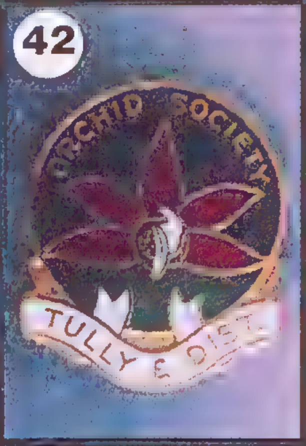

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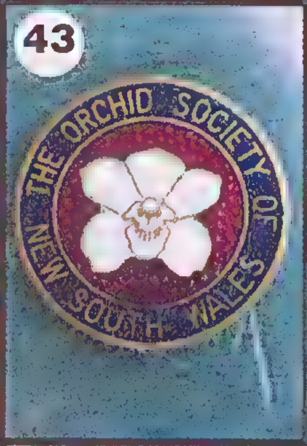

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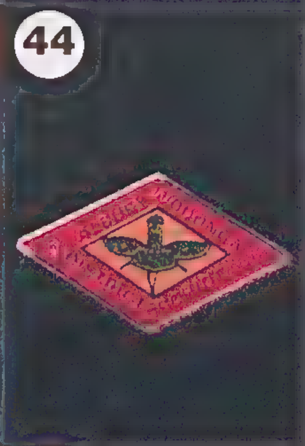

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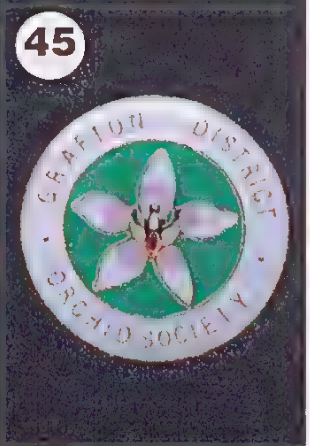

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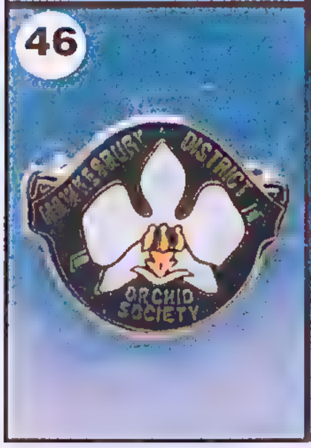

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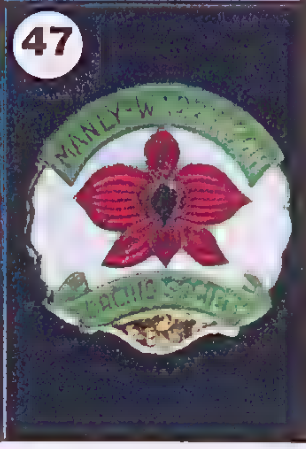

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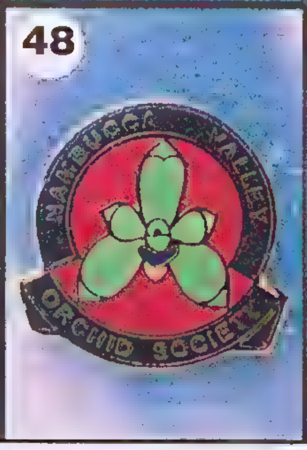

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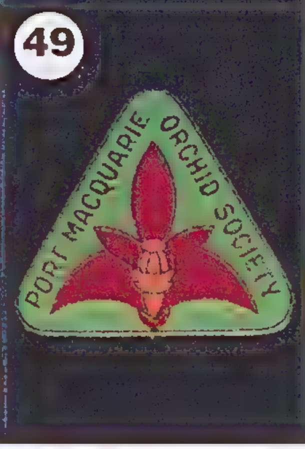

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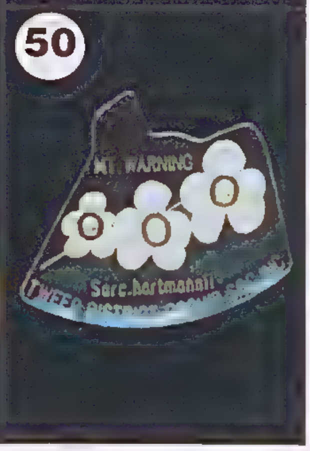


Australian Native Orchids on Badges

Photos W.T. Upton

REMINISCENCES OF A NATIVE ORCHID LOVER

Laurie Holmes,
8 Jennings Road,
Wyong, N.S.W. 2259

It would be about 1933–34 that I first had an acquaintance with a tiny bush flower, launching me into a study which has enmeshed me in its clutches to this very day.

A city boy by birth, I knew nothing of the outdoors, but the severity of the "Great Depression" soon altered all that. Humping the "Bluey" around Victoria, wildflowers were the last thing in my mind. Survival was uppermost; I will not go into that, least to say, I found myself in Yarram (South Gippsland), my aunt saved me from the rigours of "the wallaby". I learnt to use an axe, trap bunnies, milk cows and to generally be useful.

I was yarning with an old bushman, Jack Bolger of Won Wron, at his hut one day, when I noticed some most unusual flowers growing around the hut. The shape and colour amazed me, I took one home, asked around and found out from another interested person, that this was an orchid, a Spider Orchid, they were rather common but I could not obtain any further information or a name. As there were no available books on the subject, we actually did not know what was what, so interest waned. For the sake of brevity we must skip quite a few years.

1948, I secured a job with the N.S.W. Forestry Commission at Wyong and camped in Olney East State Forest, at a place called Yambo. Felling timber by day, all by the axe and saw; no chain saws in those days, I often found time in the summer evenings to stroll about, immersed in the beauty of nature. I must add that for a number of years I had been a subscriber to the nature book "Wild Life", Victorian edition and had amassed a good knowledge of orchids. It was in this monthly book that N. H. Seward Pty. Ltd., of Melbourne, had advertised *The Orchids of New South Wales* by H. M. R. Rupp. I quickly secured a copy, at I fancy about 15/-. Once I had obtained this book the gate opened for some wonderful days of exploration and pleasure. I became so absorbed I decided to collect and press a specimen of each species I found. Maybe my pressed specimens were not up to the standard of the N.S.W. Herbarium, but something that would satisfy my eagerness and thirst for knowledge. My intent was to collect and press as many local species from the districts where they grew.

It was at Yambo that I pressed my first flowers in August, 1949. *Pterostylis nutans* was the first. During the next few years, whilst I was camped there, many different species were collected.

My correspondence with the National Herbarium in Sydney commenced on 22nd September, 1949, letters signed by R. H. Anderson, Chief Botanist and Curator, are held by me.

This correspondence continued over many years, as my book pressings, increased so did my letters to the Herbarium, until the find, at Norah Head, of a new species on 24th August, 1952. The specimens and letters passed to and fro, establishing that the Norah Head specimen was new. It was named by the Rev. Rupp as *Caladenia holmesii* and he advised me in his letter dated 14th October, 1953.

I corresponded with the Rev. Rupp for over three years and it was of considerable importance to me. Although I never met him, I felt a great affinity with him, he encouraged me to keep at it and his letters to me were a bonus. All the staff at Sydney were most helpful especially Mr Anderson as his many letters prove.

To sum up, in all I found, 30 different genera, made up of 23 terrestrial genera, of which 70 species were found in the Central Coast Division and seven epiphytic genera, 22 species found in the brushes of Watagan Mountains. Most, but not all have been pressed. I still have all the correspondence and records. Although not as active these days, I still retain my great interest and love of these wonderful treasures.

Below is a list of some of the native orchids collected in the Wyong area, together with the name of the place where the pressed specimen was found.

TERRESTRIAL

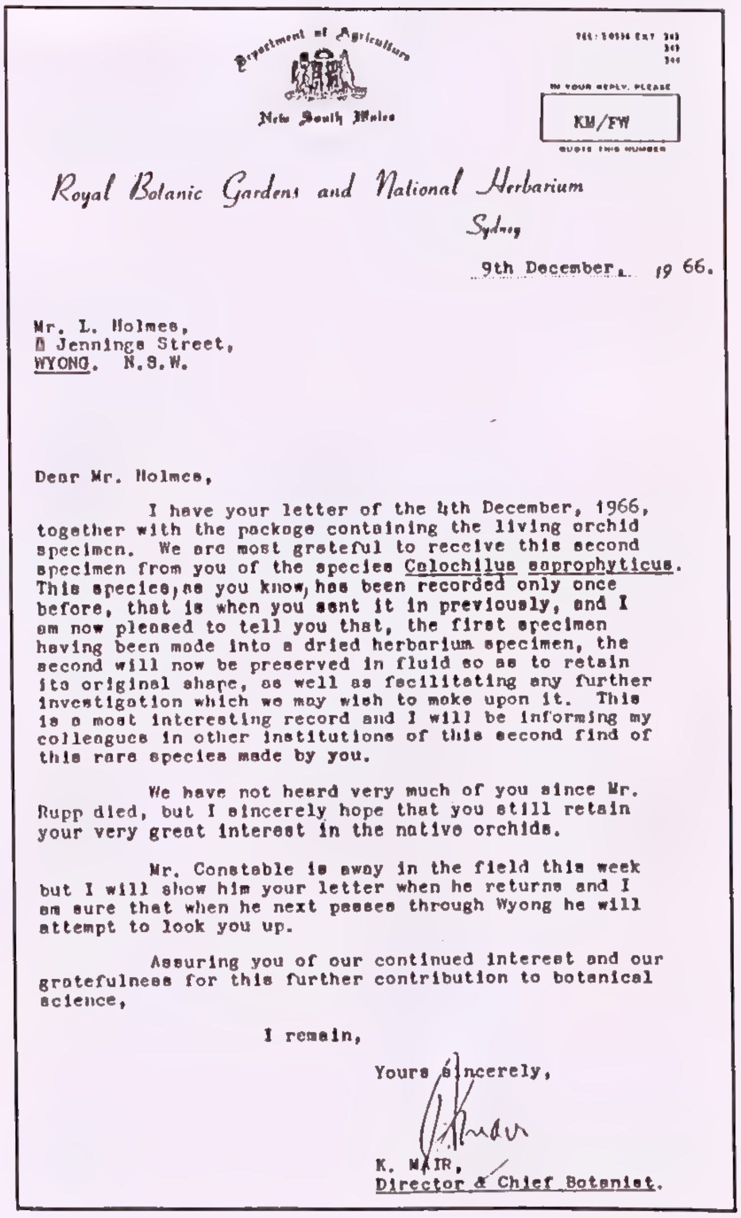
Acianthus caudatus, Macpherson State Forest
  A. exsertus, Yambo
  A. fornicatus, Ourimbah State Forest
Caladenia caerulea, Norah Head
  C. alba, Watagan Mountain
  C. alba var. *picta,* Yambo
  C. carnea, Yambo
  C. carnea var. *minor,* Norah Head
  C. carnea var. *gigantea,* Norah Head
  C. holmesii, Norah Head
  C. testacea, Olney State Forest
  C. tessellata, Norah Head
Calanthe veratrifolia, Ourimbah State Forest
Caleana major, Norah Head
  C. minor, Ourimbah State Forest

Calochilus campestris, Watagan State Forest
  C. gracillimus, Ourimbah State Forest
  C. paludosus, Ourimbah State Forest
  C. robertsonii, Yambo
  C. saprophyticus, Carrolls Mill & Moffats Point
Chiloglottis reflexa, Ourimbah State Forest
Corybas aconitiflorus, Ourimbah State Forest
  C. fimbriatus, Ourimbah State Forest
  C. pruinosus, Ourimbah State Forest
Cryptostylis subulata, Ourimbah State Forest
  C. erecta, Ourimbah State Forest
Dipodium punctatum, Yambo
Diuris Aurea, Ourimbah State Forest
  D. punctata, Ourimbah State Forest
  D. palachila, Wyong State Forest
  D. sulphurea, Ourimbah State Forest
Eriochilus cucullatus, Mandalong
Galeola cassythoides, Tin Dog Point
Gastrodia sesamoides, Mandalong
Glossodia major, Ourimbah State Forest
  G. minor, Norah Head
Lyperanthus suaveolens, Yambo
Microtis oblonga, Red Ochre
  M. parviflora, Norah Head
Orthoceras strictum, Yambo
Prasophyllum archeri, Red Ochre
  P. aureoviride, Norah Head
  P. brevilabre, Yambo
  P. elatum, Watagan Mountain
  P. fimbriatum, Ourimbah State Forest
  P. flavum, Watagan Mountain
  P. viride, Ourimbah State Forest
Pterostylis acuminata, Yambo
  P. baptistii, Ourimbah State Forest
  P. concinna, Yambo
  P. curta, Yambo
  P. decurva, Ourimbah State Forest (National Herbarium stated this was an unsally leafy form)
  P. grandiflora, Yambo
  P. longifolia, Yambo
  P. mutica, Mandalong
  P. nutans, Yambo
  P. obtusa, Yambo
  P. parviflora, Mandalong
  P. pedunculata, Yambo
  P. revoluta, Ourimbah State Forest
  P. rufa, Yambo
Rimacola elliptica, (semi-terrestrial) Ourimbah State Forest
Spiculaea irritabilis, Ourimbah State Forest
Spiranthes sinensis, Ourimbah State Forest
Thelymitra carnea, Red Ochre
  T. chasmogama, Norah Head
  T. ixioides, Watagan Mountain
  T. longifolia, Red Ochre
  T. media, Red Ochre
  T. pauciflora, Yambo

EPIPHYTE

Bulbophyllum crassulifolium, Watagan Mountain
  B. exiguum, Brush Gullies, Wyong
  B. intermedium, Watagan Mountain
Cymbidium suave, Yambo
  C. canaliculatum, Ourimbah State Forest
Dendrobium aemulum, 1. Ironbark form, Watagan Mt.
    2. Rainforest form, in tops of "Turpentine"
  D. beckleri, Brush Gullies, Wyong
  D. gracilicaule, Watagan Forest areas
  D. linguiforme, Brush Gullies, Wyong
  D. pugioniforme, Watagan Mountain
  D. speciosum, throughtout area
  D. striolatum, Olney State Forest
  D. teretifolium var. *fairfaxii,* Wyong Creek
  D. tetragonum, Wyong Creek
Liparis reflexa, Ourimbah State Forest
Papillilabium beckleri, Brush Gullies, Wyong
Plectorrhiza tridentata, Brush Gullies, Wyong
Sarcochilus australis, Watagan Creek
  S. falcatus, Brush Gullies, Wyong
  S. hillii, Ourimbah State Forest
  S. olivaceus Ourimbah State Forest
  S. spathulatus, Brush Gullies, Wyong

[Ed.—I was privileged to view all the pressed specimens, the letters from Rev. H. M. R. Rupp, the letters from the National Herbarium and many other records that Laurie Holmes has. I would like to publish all of them, but space will not allow, however, the following letter from Knowles Mair will be of great interest]. ✽



Department of Agriculture
New South Wales

IN YOUR REPLY, PLEASE
KM/FW
QUOTE THIS NUMBER

Royal Botanic Gardens and National Herbarium
Sydney

9th December, 1966.

Mr. L. Holmes,
8 Jennings Street,
WYONG. N.S.W.

Dear Mr. Holmes,

I have your letter of the 4th December, 1966, together with the package containing the living orchid specimen. We are most grateful to receive this second specimen from you of the species Calochilus saprophyticus. This species, as you know, has been recorded only once before, that is when you sent it in previously, and I am now pleased to tell you that, the first specimen having been made into a dried herbarium specimen, the second will now be preserved in fluid so as to retain its original shape, as well as facilitating any further investigation which we may wish to make upon it. This is a most interesting record and I will be informing my colleagues in other institutions of this second find of this rare species made by you.

We have not heard very much of you since Mr. Rupp died, but I sincerely hope that you still retain your very great interest in the native orchids.

Mr. Constable is away in the field this week but I will show him your letter when he returns and I am sure that when he next passes through Wyong he will attempt to look you up.

Assuring you of our continued interest and our gratefulness for this further contribution to botanical science,

I remain,

Yours sincerely,

K. MAIR,
Director & Chief Botanist.

GERALD McCRAITH, A.M.

Ron Kerr,
260 Geoffrey Road,
Chittaway Point, N.S.W. 2259

The Anniversary Day Honours List announced Gerald McCraith as a Member of the Order of Australia, in recognition of his contribution to horticulture.

Gerald joined the Victorian Orchid Club in 1931 and after war service became its President. he helped form the Australian Orchid Council and was its first vice-president. He became president in 1963 and served until 1969. He was a key figure in organising the Sixth World Orchid Conference held in Sydney in 1969. Since then he has served on many international committees pertaining to orchids and conservation.

In 1970 he teamed with Hermon Slade to found the Australian Orchid Foundation for the purpose of promoting the culture, conservation and research into all aspects of orchids. Gerald has been Chairman of the Foundation ever since.

Two years ago a grant of $2,500 from the Foundation assisted *The Orchadian* to continue publication. Grants to botanical institutions have resulted in new native orchid discoveries and the extension of the range of others.

The National Botanic Garden, Canberra, which specialises in native plants, has been substantially funded to carry out work on orchids, including the saving of endangered species. Also computer equipment was jointly supplied by the Orchid and Slade Foundations at a cost of $24,000.

Money has been provided for dozens of projects as diverse as fencing orchid reserves and providing orchid plants for the butterfly house at Melbourne Zoo.

The Foundation imports hard to get orchid books and also publishes items ranging from substantial books to short research papers. A major achievement was the translation of Schlechter's *Orchidaceae of German New Guinea* and its publication at a cost of $70,000.

At the time Gerald became President of the Victorian Orchid Club it was expanding rapidly and holding shows for charity. He supported Sir John Hall-Best in forming the Australian Orchid Council and became its president 1964 to 1969. He played a major part in organising the Sixth World Orchid Conference, its show noted for native orchids. That show marked the maturity of the hobby in Australia and Gerald was quick to realise that for future growth research was a vital need.

The A.O.F. is controlled by a Board of seven and a research committee approved by the C.S.I.R.O. It is funded by tax deductible donations which go to a Trust Fund and only the interest is used to finance projects.

Gerald ensures that the Foundation does not only depend on donations. He is a skilled hybridiser and has registered over a 100 crosses. Flasks of these are sold and ALL proceeds go to the Trust Fund.

For more than 60 years Gerald McCraith has dedicated himself to making orchid growing a satisfying hobby for people and through this to contribute to plant science.

Gerald's 1000's of friends will all acclaim this well earned recognition of his work for others. ✤

Gerald McCraith happily sorting botanical specimens at Kaiap Lodge near Wabag, Enga Province, Papua New Guinea. Photo Mrs Lois Dixon-Ward

TESTAMONIAL DINNER

TO HONOUR

MR. GERALD McCRAITH A.M.

who was appointed a Member of the Order of Australia
in the recent Australia Day Honours for his service
to horticulture, particularly in the culture of orchids.

The Organising Committee invites you to celebrate with Gerald at

Chaucer's Canterbury,
190 Canterbury Road, Canterbury, Victoria 3126.
on
Saturday 4th September, 1993
at 7.00pm for 7.30pm
Donation $55.00 single all inclusive
Dress Lounge Suit

For tickets and further information, contact:
Mrs. Helen Richards, 39 Ryland Avenue, Croydon, Victoria 3136.
Telephone: (03) 723-5073 Fax: (03) 879-7075.
Cheques should be made payable to 'Gerald McCraith Testamonial Dinner'.

For catering purposes the organisers would greatly appreciate an early indication of your intention to attend
If required assistance will be gladly given in arranging accommodation in Melbourne.

Very Special Evening   Good Company   Good Food   Easy Parking

AUSTRALIAN NATIVE ORCHIDS HYBRID REGISTRATIONS

(New registrations from lists in *The Orchid Review*, August, 1992 to April, 1993)

Name	Parentage	Registered by
Dendrobium		
Alien Glow	Golden Glory X Ellen	R. E. Harris
Alisha Staff	Pauline Ranking X *kingianum*	T. Maxwell (H. G. Young)
Bellingen	Bright Spark X Hilda Poxon	W. T. Upton
Centaur	Coral Sun X Peter	R. E. Harris
Cheryl Diane	Kingrose X Joy Wray	S. Wray
Chrystaline	Kathryn Banks X Bicentennial Blush	W. Skillicorn
Clarrie Wuth	Sun Star X *speciosum*	Florafest
Coral Eclipse	Hilda Poxon X Coral Sun	R. E. Harris
Crudine	Peter X Gracious Falcon	C. Brandon
Ember Glow	Golden Glory X Eureka	W. Skillicorn
Fiestafal	King Falcon X Fiesta	W. T. Upton
Fleckwitt	Graham Hewitt X *fleckeri*	N. Roper
Glamour	Aussie Sandy X Aussie Quest	W. Skillicorn
Golden Battern	Jamie Upton X *canaliculatum*	N. Roper
Golden King	Dusky Girl X *speciosum*	So. Cross (Aust.) (G. Hellen)
Gracious Baron	X*gracillimum* X Red Baron	W. T. Upton
Green Gold	Eureka X Susan	W. Skillicorn
Iris Jones	Joy Wray X Bardo Rose	S. Wray
Jesmond Dazzler	Aussie Ira X Sunglow	J. Purvis
Jesmond Fancy	Zip X Peter	J. Purvis
Jesmond Splendour	Zip X Jesmond Gem	J. Purvis
Kalbar	Karani X Coral Sun	R. E. Harris
Karsun	Karloo X Sunglow	C. Brandon
Maggie May	*canaliculatum* X *bifalce*	A. Lane
Meroo	Nooro X Gracious Falcon	C. Brandon
Minispec	Mini Pearl X *speciosum*	N. Roper
Oaky	Ellen X Kalang	. Brandon
Peach Witt	Graham Hewitt X Peach Glow	N. Roper
Pink Ice	Eureka X *bigibbum*	W. T. Upton
Piximum	Pixie X X*gracillimum*	W. T. Upton
Quell	Ellen X Aussie Quest	W. Skillicorn
Republican First	Maron X Hilda Poxon	H. G. Young
Sand Gul	Gulginni X Aussie Sandy	W. Skillicorn
Sandstone	Hilda Poxon X Aussie Bounty	R. E. Harris
Singletons Pride	Rosella X Nunkumbil	W. T. Upton
Snowman	Gillian Leaney X Aussie Sandy	W. Skillicorn
Star Glow	Star Of Riverdene X Gillian Leaney	W. Skillicorn
Strawberry Moon	Ellen X Coral Sun	R. E. Harris
Sunbird	Aussie Aurora X Coral Sun	R. E. Harris
Thai Pearl	Lloyd Stainton X Mini Pearl	Suphachadiwong
Tropical Wit	Tully X Graham Hewitt	N. Roper
Wiagdon	Peter X Nooro	C. Brandon
Yondi Cascade	Peter X Gracious Cascades	S. Batchelor
Yondi Extra	Jamie Upton X Peach Glow	S. Batchelor
Yondi Fire	Aussie Bonanza X Jamie Upton	S. Batchelor
Yondi Gold	Peter X Peach Glow	S. Batchelor
Yondi Kingston	Yondi X Star Of Gold	S. Batchelor
Yondi Sparkle	Lynette Banks X X*gracillimum*	S. Batchelor
Diuris		
Golden Wand	*aurea* X *drummondii*	L. & M. Nesbitt
Parachilus		
Lotus	*Sarcochilus* Lois X *Parasarcochilus spathulatus*	W. Skillicorn
Pterostylis		
Trunkfish	*truncata* X *fischii*	L. & M. Nesbitt
Rhinochilus		
Josie	*Sarcochilus* Mavis X *Rhinerrhiza divitiflora*	Florafest (N. Rosenberger)
Orange Stars	*Sarcochilus falcatus* X *Rhinerrhiza divitiflora*	Florafest (D. Feldman)
Sarcochilus		
First Light	Aussie Dawn X *hartmannii*	N. Finch
Heartlight	Pinkhart X *hartmannii*	D. Banks
Otways	Lois X *australis*	Florafest (L. Fagg)
Pink Blossom	Pinky X *falcatus*	Florafest (L. Fagg)
Selina	Arcadia X *fitzgeraldii*	W. T. Upton
Thelymitra		
Kay Nesbitt	*antennifera* X *rubra*	L. & M. Nesbitt

AROUND THE GROUPS

A new Group has been formed in Western Australia to be called A.N.O.S. of Western Australia Inc. Honorary Secretary is Ross Wilton, 21 Loma Street, Cottesloe, Western Australia 6011, phone (09) 384-3160.

* * *

At the inaugural meeting of the A.N.O.S. Mid-North Coast Group, 23 interested people attended and 11 others apologised at being unable to attend. They are to hold meetings each month, in the towns of Taree and Wauchope alternatively. The President elected was Dennis Sinclair, 68 Ritchie Crescent, Taree, N.S.W. 2430, phone (065) 52-4699.

* * *

A.N.O.S. Central Coast Group — At the December meeting the following motion was passed unanimously by the 27 members present. "That the Central Coast Group of A.N.O.S. agrees that the existing boundaries of A.N.O.S. remain unchanged.

* * *

A.N.O.S. Warringah Group are holding their Spring Show at the Forestville Memorial Hall, Starkey Street, Forestville on Saturday, 4th September, from 9 a.m. to 8 p.m. and on Sunday, 5th September, from 9 a.m. until 4 p.m. Benching is on Friday, 3rd, from noon until 8.30 p.m.

* * *

— VALE —

Foundation member Bert Bushell passed away on Tuesday, 16th March. He and his wife Betty were on their way home from a Bankstown Orchid Society meeting when he apparently had a heart attack and died. Bert was a Life Member and one time Vice-President of Sydney Group and a member of Hawkesbury Group. He was always extremely active in all group activities and will be greatly missed by all who knew him. I am sure our members will join in offering our heart felt sympathy to his wife Betty. Vale — Bert.

* * *

A New Group for South-East Queensland

Norman Hilliger,
2/13 Possum Crescent,
Runaway Bay, Queensland 4216

The inaugural meeting of the new group was held in November, 1992. After much discussion the name Logan Group was adopted. The following executive were elected to see the group through its first year.

President:	Alf Leggert	(07) 341-1422
Vice-President:	John Roberts	(075) 33-2181
Secretary:	Peter Ward	(07) 299-6195
Treasurer:	Richard Harwin	(07) 208-3391

Postal Address: P.O. Box 2103,
Crestmead D.C.
Queensland 4132

The group has selected as its floral emblem *Dipodium variegatum*. The type locality for this species is given as Beenleigh, beside Pacific Highway and this is approximately 12kms from the group's meeting place. Meetings are held at 8 p.m. on the second Wednesday of each month at the Logan City Amenities Building, corner of Smith Road and Kingston Road, Woodridge (entrance from Kingston Road) This is about 20kms from the Brisbane C.B.D. and approximately 50kms from the Gold Coast. Visitors and new members are most welcome. We are looking for guest speakers, if anyone from the "deep south" is travelling north to the "sunshine state" and has the time, we would be delighted to welcome you. ✻

THE
AUSTRALASIAN NATIVE ORCHID
SOCIETY
(VICTORIAN GROUP) INC.
Invites you
to our
25TH ANNIVERSARY CELEBRATION
&
COUNTRY MEMBERS DAY
on
SATURDAY 4TH SEPTEMBER, 1993
From 10.00AM - 4.00PM
at
National Herbarium
Royal Botanic Gardens
Birdwood Avenue
South Yarra
(Melway Map 58, A.1)

Native Orchid Plant & Seedling Sales
Epiphyte & Terrestrial Cultivation Talks
Potting, Mounting & Deflasking Demonstrations

You are also invited to attend our regular meeting night on
Friday the 3rd of September at 8.00pm at the National Herbarium.
Graeme Carr
will be our guest speaker.

Enquiries: Helene Wild, 56 Civic Parade, Seaholme 3018. Telephone (03) 398-2617.

BOOK REVIEWS

AUSTRALIAN INDIGENOUS ORCHIDS, Volume 1. The Epiphytes. The Tropical Terrestrial Species. By Alick W. Dockrill.

Published by Surrey Beatty & Sons, in association with Society for Growing Australian Plants.

Publishers address: 45 Rickard Road, Chipping Norton, N.S.W. 2170.

ISBN 0 949324 44 2.

250mm x 185mm hard cover, 566 pages, 165 black & white drawings, 66 colour plates.

Price: $78.00

When Alick Dockrill's *Australian Indigenous Orchids* was first published in 1969 it was hailed as a great work and an essential addition to the native orchid lovers library. Since it has been out of print, there has been a sense of loss, it has been eagerly sought after, but nobody wanted to sell their copy and those who were lucky enough to find one, paid a big price for it. Now it is back, bigger and better than ever, crammed with up to date information by the man who really knows our Australian native orchids. It is completely revised, an absolute wealth of knowledge, if you really want to know about the native orchid you grow, this is the book to tell you.

There have been 59 name changes since the first edition and 50 species added to the list of tropical Australian orchids, 27 of these new to science, 20 new to Australia and three recorded from the tropics for the first time. Seventeen putative natural hybrids have been recorded. All subspecies taxa are referred to as varieties.

After the introduction, the book starts off with a description of the Family *Orchidaceae,* where it fits into the Plant Kingdom, its distribution, the classification he follows throughout this work, etc. He follows the most recent and generally accepted classification of Dressler, published in 1981 in his book *The Orchids Natural History and Classification*. This is a departure from the first edition when he followed Vermeulen and Schlechter.

After this we have a complete summary of the systematic treatment of Australian Orchidaceae. A key to the subfamilies is given together with detailed drawings of the column and pollinia of typical members of each. Then we come to the meat of the book; this is easy to follow. The very detailed descriptions although in botanical terms (it is a pity the Glossary is in Volume 2) are accurate and orderly and precise, each is followed with general notes in non-technical terms. The order of the descriptions throughout is family, subfamily, tribes, subtribes, genera, species; you are not left in doubt where each species fits into the overall scheme. Keys are given facilitiating the identification of each taxon.

Each individual species is accompanied by a distinctive Dockrill drawing, showing all the parts of the flower as well as the plant.

The list of synonyms is complete together with all references needed for further study.

Distribution, habitat, flowering times and all pertinent facts are given.

The genus *Dendrobium* is broken up into three subgenera namely *Dendrobium, Rhopalobium* and *Xerobium.* Only three sections of the subgenus *Dendrobium* are dealt with in this volume they are *Australorchis, Dendrocoryne* and *Latouria. Dendrobium speciosum* is regarded as a complex of six varieties, not separate species. *Dendrobium tetragonum* as a complex of four varieties.

There is a chapter on culture given in Volume 2, we will have to wait for this. I agree with the author cultural notes for each species would be out of place in a work of this nature; the habitat and distribution notes provide pointers to individual requirements.

An appendix gives a general key to all the Australian genera or Orchidaceae (disregarding classification). The index covers both Volume 1 and 2, making one realise it is a pity that they did not both come out together, I cannot wait to get the next volume.

It would not be a review if I did not mention a few distressing problems and I quickly mention that none of them will affect the true value of the book, they appear to be of an editorial nature. I am sure they greatly distress the author.

Incorrect spelling of names of very well known and important personalities in the native orchid world; anyone who knows them will understand the anguish of such errors.

I find that ending a volume half way through the genus *Dendrobium,* (the most popular and most frequently grown of all our native genera) most irritating, particularly when the two volumes are not published together. Also I do not expect to see colour plates in Volume 1 referring to species in Volume 2, maybe this is a marketing idea to ensure we buy both Volumes.

Furthermore I do not expect to see photos of epiphytes in the terrestrial section of the book.

A delightful picture of *Sarcochilus australis* is upside down, perhaps this could be repeated in Volume 2, the right way up, after all that is where the species is described anyway.

The colour plates are, in my opinion, of excellent quality and greatly add to the general appeal of the book.

It is good value for $78.00 and can be obtained from the publishers or leading natural history bookshops.

○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

WILD ORCHIDS IN THE FAR SOUTH OF NEW ZEALAND by Ian St. George.

Publishers: The New Zealand Native Orchid Group. 22 Orchard Street, Wadestown, Wellington, N.Z.

ISBN 0–9597931–0–8.

210mm x 145mm soft cover, 107 pages, 54 superbly executed black & white drawings, colour plate on the cover.

Price: $NZ15.00 including post & packaging.

This delightful little book is a must for those interested in our native orchids, particularly those which grow both in New Zealand and Australia. It covers the area south of the Waitaki River, approximately the bottom one third of the South Island of New Zealand and includes Stewart Island.

Forty-seven species, about half of all the species reported from New Zealand are included. The easy to follow text, describes the orchid in simple terms, its occurrence, its cultivation and historical notes. All relevant details are given about the orchid, its common name, its habitat, how it differs from its nearest relative, when it flowers, pollination details, conservation status and the historical notes are most interesting and include many quotes from our early botanists. This is a book that makes the orchid come alive as you read about it. The author's love of his countries native orchids is obvious in his superbly executed drawings; from the detail it is very easy to identify a species.

Keys are given for the southern species of *Pterostylis* and *Thelymitra.*

Pollination of the southern orchids is dealt with as a separate chapter with lists of those, predominately insect-pollinated and those predominately self-pollinated. Four drawings clearly show and describe the method of pollination.

Flowering times are given in a complete list at the rear of the book, as well as a list of what the names mean.

I enjoyed reading through this book. It can be obtained from the publishers — The New Zealand Native Orchid Group, 22 Orchard Street, Wadestown, Wellington, New Zealand, $NZ15.00 including post and packaging. ✾

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If you have misplaced the Membership Renewal Application, another is enclosed. Send this and your remittance or credit card authorisation to:–

A.N.O.S. Inc.,
P.O. Box C106, Clarence Street, Sydney,
N.S.W. 2000 Australia

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THE SECOND AUSTRALASIAN NATIVE ORCHID SOCIETY CONFERENCE AND SHOW

Hosted by The Native Orchid Society of Toowoomba Inc.

17th, 18th and 19th September, 1993

To be held at The University of Southern Queensland, located in the south-west Toowoomba suburb of Darling Heights and is adjacent to the Japanese Gardens.

The show, in the Basketball Stadium off Baker Street, will be one of the greatest shows of Australasian native orchids ever seen, comprising spectacular displays of native orchids by both individual growers as well as societies. Commercial sales areas; where you will have the opportunity to buy from Australia's leading hybridists and growers.

The conference venue is within easy walking distance of the show. Excellent speakers from the U.S.A., New Zealand, New Guinea and Australia will cover many interesting and informative subjects from culture to hybridising and conservation of our native orchids. Some lecture titles are: Australasian native orchids on the American orchid scene — Cultivation of New Zealand native orchids — In vitro germination of terrestrial orchids, deflasking and establishment in pot culture — Native orchids of north Queensland — Conservation of native orchids in Papua/New Guinea — Asian immigrants into the orchid flora of Papua/New Guinea and Australia and three lectures on hybridising, both terrestrial and epiphyte. The after dinner speaker at the banquet is Helen Richards from Victoria.

Full registration is $120.00.

Daily passes to lecture sessions are:–

First day $60.00 (this allows for entry to all lectures on that particular day, morning or afternoon teas as applicable and a copy of the proceedings booklet).

Each subsequent day $30.00 (this allows entry into all lectures on that particular day plus refreshments).

Toowoomba is known as the "Garden City". Spectacular tree-lined streets, 105 individual parks with a total area of 264 hectares. The conference is a fitting addition to the Carnival of Flowers being held from 18th to 26th September.

Further details and Registration Package available from:–

The University of Southern Queensland,
Meetings and Events Section,
P.O. Box 282, Darling Heights,
Toowoomba, Queensland 4350
Telephone: (076) 31-2190
Fax: (076) 35-5550.

Reprinted from *The National Parks Journal*, December, 1992 –

ORCHID THIEVES FELL ANCIENT BEECH TREES

Between May and July of this year 44 Antarctic Beech trees, some more than 800 years old, have been cut down near Plateau Beech Picnic Area in Werrikimbe National Park. These old giants were brought down so the vandals could get the orchids high up in the canopy.

Somewhere these orchids are bound to turn up for sale. If they have no N.P.W.S. tag attached, they are illegal; the person selling the plants and the person buying them, are both committing a criminal offence and should be reported promptly to the nearest N.P.W.S. office.

LETTER TO THE EDITOR

The Editor,

re: Ira Butler Trophies for 1992
Corrigendum

The following result was accidently omitted from the results of the Silver Trophies won in 1992.

Tasmanian Orchid Society Spring Show.
Dendrobium Bardo Rose 'Bronilyn'
J. F. and B. M. Smith.

Sincere apologies to Mr and Mrs Smith.

Ruth Rudkin,
Honorary Secretary,
Ira Butler Trophy Committee

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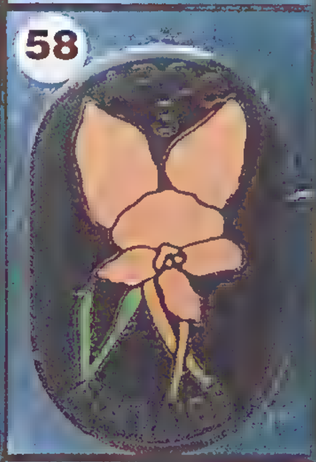

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Australian, New Zealand & Papua/New Guinea Orchids on Badges *Photos W.T. Upton*

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